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Statistics of typical programme sound pressure levels in sound studios and their control rooms

D.J. Meares, B.Sc.(Hons.)

Research Department, Engineering Division
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STATISTICS OF TYPICAL PROGRAMME SOUND PRESSURE LEVELS IN SOUND STUDIOS AND THEIR CONTROL ROOMS

D.J. Meares, B.Sc.(Hons.)

Summary

A survey has been carried out in several types of sound studios to find the variations, with time, of the sound pressure levels generated in these areas. A description is given of the survey and the data processing system used to compute the results, which are given in tabular and graphical form in the Appendix.

The results indicate that a revision of some of the data given in an earlier Research Department Report[1] *is necessary.*

Issued under the authority of

P. Rainger

Head of Research Department

Research Department, Engineering Division,
BRITISH BROADCASTING CORPORATION
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(PH-114)

STATISTICS OF TYPICAL PROGRAMME SOUND PRESSURE LEVELS IN SOUND STUDIOS AND THEIR CONTROL ROOMS

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STATISTICS OF TYPICAL PROGRAMME SOUND PRESSURE LEVELS IN SOUND STUDIOS AND THEIR CONTROL ROOMS

D.J. Meares, B.Sc.(Hons.)

1. Introduction

With the advent of pop groups and loudspeakers capable of providing high power, with good quality, for monitoring in control cubicles, it has been necessary to carry out a comprehensive survey of sound pressure levels in production areas so that the sound-insulation requirements, between the studios and their surroundings as listed in PH.21,[1] can be brought up to date. A report will be issued later to revise PH-21.

2. Survey details

Eight classes of sound studio, as listed in Table 1, were investigated for this survey and recordings of half-hour duration were made on a number of occasions in representative studios. The number of half-hour samples taken in each environment depended to some extent on the variety of material produced there; thus the general purpose studios were studied more closely than, say, the drama studios. The number of samples taken was also decided by consideration of the variability of the material (from one sample to another). The first few samples taken in the large drama studios were very similar to one another and so only five samples were collected. On the other hand, pop music was found to be extremely variable and hence a total of fifteen half-hour samples were obtained.

The occasions on which the studios were visited were selected with prior knowledge of the material, so that, as far as possible, an examination could be made of the entire range of sound pressure levels (SPLs) within each type of studio. At each session calibrated recordings were made of the reverberant field sound generated in the studio, the control room and, where applicable, the recording channel; the sound was picked up on a sound level meter (SLM) using a one-inch (25 mm) microphone (see Fig. 1) and the electrical output from the SLM was recorded on a standard tape recorder. Each recording also contained a calibration signal, produced by attaching a 'piston-phone' calibrator to the SLM, and a selection of tones to check the response/frequency characteristic of the overall system during the signal processing stage.

The recordings were processed to find how the sound in the studio varied with time. In order to process the signals, each tape recording was played back into a one-third-octave spectrum-analyser which was made to sweep through the spectrum at a rate of ten sweeps per minute (for a half-hour recording), sampling and digitising each one-third-octave band in turn, starting with the 50 Hz band

TABLE 1

Studio Classification

Type		Use	Examples (in London)	Number of Samples Collected
1	Orchestral music studio	Classical and light orchestras	MV1	21
2	General purpose studios with room for large audience	Opera, jazz, dance bands, folk, comedy, pop groups, brass bands, light and classical orchestras	Paris Theatre	39
3	Recital studios	Groups of up to 10 artists (Classical)	MV2	10
4	Pop studios	Pop groups, dance bands (no audience)	MV4	15
5	Large drama	Drama	~~B6~~ 6A	5
6	Small drama	Small drama and schools broadcasts	PP1	4
7	Talks studios (all sizes)	Discussion, news, current affairs, continuity (except pop)	3E	12
8	Continuity (pop)	Radio 1 disc jockeys	Con. C	9

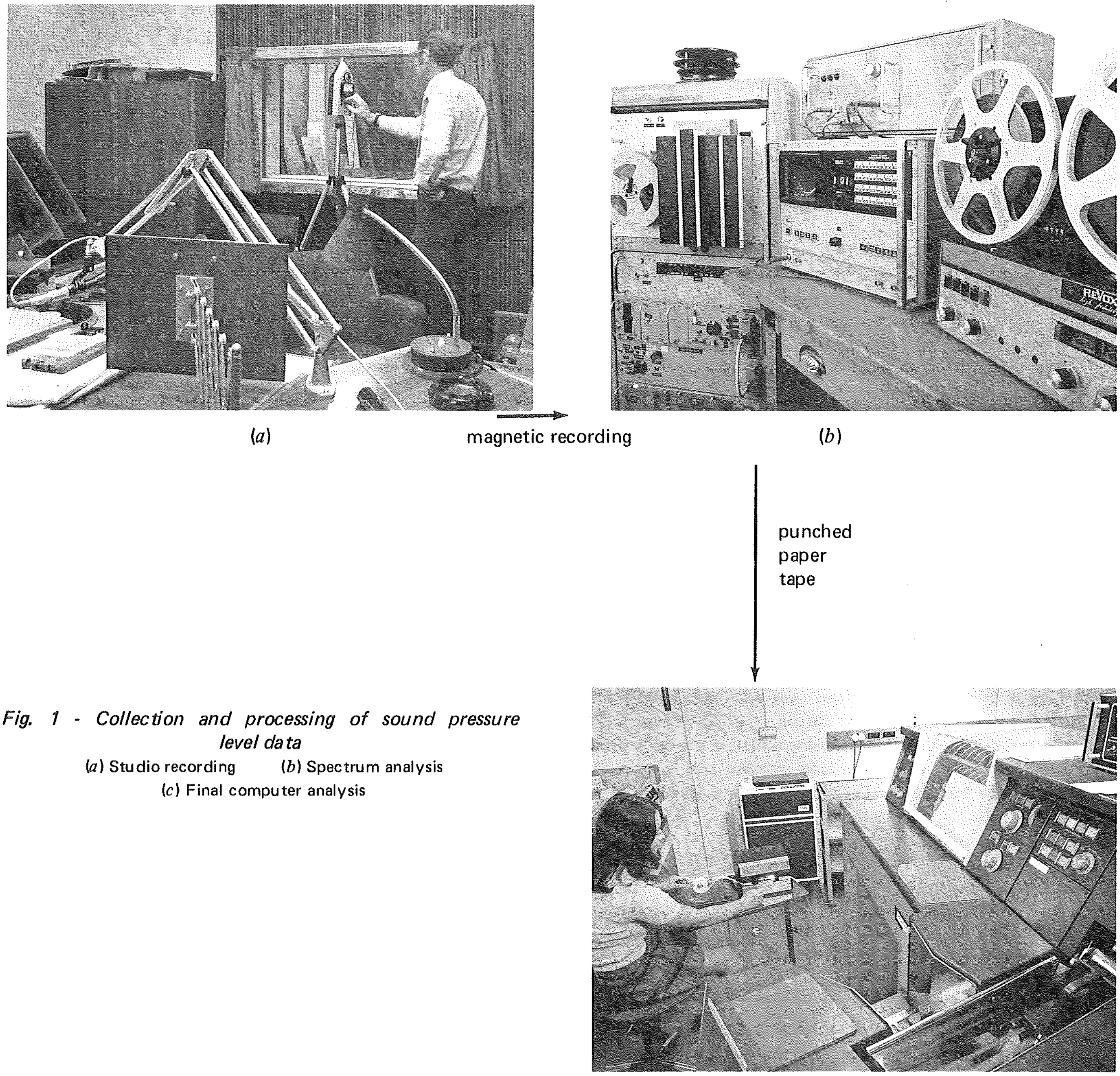

Fig. 1 - Collection and processing of sound pressure level data
(*a*) Studio recording (*b*) Spectrum analysis
(*c*) Final computer analysis

and finishing each time with the 10 kHz band. The digital values for each band were then punched onto paper tape in blocks of five five-bit characters, one block per one-third octave sample. The first two characters in each block contained an identification code, to indicate the start of the block, and a binary code for the centre frequency of the third-octave band. The final three characters in each group contained the numerical value of the sample.

3. Computer programme

The computer programme used to process this data operates as follows. Each five-character block of data is read in and the first two characters are examined to find the frequency-band from which the sample was obtained. The final three characters are then decoded and the SPL value thus obtained is stored within the processor. When all the data has been read into the computer, all the values for the 50 Hz band are sorted and re-stored such that the highest sample value is in the first storage location, the next highest is in the second location and so on. This process is repeated for each frequency-band in turn. Thus to find the level exceeded x% of the time in a particular one-third-octave band, the computer selects the value that appears x% of the way from the start of the appropriate store; interpolation is used where necessary. The selected values, which are still in 'input units', are then converted into true sound pressure levels and equivalent 'A' weighted values are computed as appropriate, (see Section 4). The results are printed out in the tabulated form shown in Fig. 2.

```
TC71080 4/2/2
 MJQ    CAMDEN    STUDIO    2.8.71
 G=6    Q=1,5,10,20,30,40    W=10



                    SOUND PRESSURE LEVEL ANALYSIS
                    LEVEL EXCEEDED X% OF THE TIME

NUMBER OF COMPLETE RUNS = 250

      RUN      MAX      1       5       10      20      30      40
                        %       %       %       %       %       %

       50      75      73      70      68      65      64      62
       63      84      80      78      75      70      68      66
       79      93      91      88      86      83      80      76

       99      96      95      93      91      88      85      83
      125      96      92      87      86      82      80      78
      157      96      92      89      85      84      82      80

      198      94      92      90      89      87      85      83
      250      93      91      89      87      85      84      82
      315      94      93      91      89      87      85      83

      397      94      93      91      90      88      85      83
      500      94      94      92      91      89      86      84
      630      95      93      90      89      87      85      82

      794      93      90      88      85      82      80      77
     1000      92      89      84      81      77      75      73
     1260      88      86      83      80      77      74      71

     1587      91      87      82      80      75      74      71
     2000      88      84      79      77      74      72      69
     2520      79      76      75      74      72      69      66

     3175      78      76      74      72      70      66      62
     4000      78      75      73      71      69      66      63
     5040      77      74      71      69      66      64      61

     6350      75      72      68      67      64      62       1
     8000      71      69      66      64      61       1       1
    10079      68      67      64      61       1       1       1
  DBA
 EQUIVALENTS  101      99      96      94      92      89      87
```

Fig. 2 - Computer results

N.B. The value '1' is an underflow condition, see Section 5

4. Description of computer output

In addition to the titles describing the material analysed, the table of results gives the following information. For each one-third-octave hand, whose centre frequency is listed in the left-hand column, there is a row of results showing the time analysis of the sound pressure levels in that band during the recording session. The maximum level experienced appears, in dB, in the second column, the level exceeded for 1% of the time is in the third column, and so on.

The overall sound picture is summarised by the row of results labelled 'dBA equivalents'. Each of these values has been computed on the assumption that all the one-third-octave band levels tabulated in the corresponding column existed together, and it is simply an 'A' weighted summation of these.

In fact it is unlikely that the maximum values in the one-third-octave bands will all occur together, so the true maximum dBA value will be somewhat lower than the 'dBA equivalent' value. For the same reason it may be expected that the true dBA values for the longer percentages of time will be higher than the 'dBA equivalent' values. Six half-hour recordings were analysed in detail to find the difference between these two parameters. The results are given in Table 2.

This shows the expected result inasmuch as the maximum value of the dBA equivalent is approximately 3 dB above the true maximum dBA value, whereas the 40% dBA equivalent value is approximately 3 dB lower than the true dBA value. The 'breakeven' value is somewhere around the 5% point.

5. Factors which influence the results

There are three instrumental factors in the system which were found to affect the results.

(a) The one-inch microphone used with the SLM is not omnidirectional throughout the frequency range[2] and, since the SLM was generally in the reverberant sound field, the sound was incident on the microphone from all directions; it was necessary, therefore, to correct the results for what would otherwise be a high-frequency loss. The correction required for this random incidence is given in Table 3.

The effect of this correction on the 'dBA equivalent' values has been checked using suitable* examples of orchestral music, jazz music and talks, and in the worst case it increased by 0·8 dB. It is to be noted that all the results given at the end of this report have had this correction applied.

(b) The spectrum analyser used in the analysis had only a 40 dB range and thus, when its gain was adjusted to deal with the peaks of the programme material, some of the quieter passages, particularly at the extremes of the audio spectrum, fell below the range of the analysis. These 'underflows' appear in the results as a value of '1'.

(c) The bulk of the data processing was carried out on an Elliott 803 computer. This imposed a limit on the amount of data that could be processed due to the limited store capacity of 8k words. The computer could only handle a maximum of 250 samples in each of the 24 third-octave bands and thus the spectrum was sampled at a rate of approximately ten times per minute for a half-hour programme recording. The rather low sampling rate and total number of samples per session lead to small inaccuracies in the results and so a sampling accuracy test was run. Normal drama material was chosen for this test because of its transient nature and it was sampled and processed ten times. The results are summarised in Table 4.

The results are as expected, in that the standard deviation of, and hence the error in the values for the maximum levels experienced are rather high — of the

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* These samples were chosen as they had the flattest spectral distributions i.e. maximum sensitivity, for the 'dBA equivalent' values, to high-frequency changes.

TABLE 2

Average Difference Between True dBA and dBA Equivalent Values

	Max	1%	5%	10%	20%	30%	40%
(True dBA values) −(dBA equivalents)	−3·5 dB	−2 dB	+0·1	+0·5	+2	+2·7	+3·7

TABLE 3

Random Incidence Correction for the 1" Microphone

Frequency (kHz)	1	1·26	1·59	2	2·5	3·18	4	5·0	6·4	8	10
Correction (dB)	0	+0·2	+0·4	+0·8	+1·2	+1·6	+2·2	+2·8	+3·8	+5	+6·4

TABLE 4

Errors Introduced by the Sampling Technique

Percentage of time	Max	1%	5%	10%	20%	30%	40%
Averaged standard deviation of SPL results over the whole spectrum (dB)	3·0	1·8	1·0	0·9	0·8	0·8	0·7
Standard deviation of dBA equivalents (dB)	1·3	0·9	0·9	0·6	0·7	0·6	0·7

order of 3 dB. The error in the 1% value is approximately 1·8 dB and for the 5% values and above the error is 1 dB or less. However, the 'dBA equivalent' values are much less susceptible to the sampling errors. The maximum level has a standard deviation of only 1·3 dB and all the other values have standard deviations of 0·9 dB or less. Thus, as a measure of the maximum levels in a studio, the 'dBA equivalent' is more accurate than the one-third-octave values; however, for the levels exceeded for 5% of the time (or more), the one-third-octave values are equally accurate, with a standard deviation of error of 1 dB or less.

6. Discussion of survey results

The results of the survey are given in the Appendix to this report in a detailed form because it is not yet known which values will be required to compute the insulation figures. A studio designed on the basis of the maximum levels experienced in the loudest recording session would be ideal but would probably be a heavier and therefore of much more expensive construction then is strictly necessary. This over-stringent design can be eased, and hence cost can be reduced, by allowing the sound generated in the studio to become obtrusive in adjacent areas for a small percentage of the time. Exactly for what percentage of time such impairments can be allowed has not yet been decided.

The results, in the same form as the computer output, are split primarily into two parts. The results of the studio measurements are presented in the first part. The second part contains the results for the control cubicles and the recording channels; there was found to be no significant difference between these latter two types of area and so the results have been combined.

Each part of the Appendix is further divided according to studio type, as listed in Table 1. For each type of studio there are two tables of results, presented in a form similar to the computer output;* one refers to an example that is of typical or average loudness, and the other to the worst case or loudest example experienced in the survey. These tables of results are also presented in a graphical form.

The graphical presentation is of interest in that it shows an overall picture of the sound pressure levels of the programme material. For example, the graph for pop music, as shown in Fig. A1–4b, has a very compressed character, i.e. the lines are close together, and it shows that pop music tends to be very bass heavy. Orchestral music, however, (Fig. A1–1a), has a more open structure and a more even spectrum.

The graphs show quite clearly one apparently anomalous condition, see Fig. A1–6a. Material, in this case speech, which should have a decreasing content below 200 Hz seems to have large components below 100 Hz. These components, however, come from other sounds picked up within the studio; they could be sound effects in drama, talk-back from the control cubicle or even noise breaking in from outside the studio. The figures are therefore not strictly the spectra of speech or music but are the spectra of the combination of all sounds in the studio.

7. Conclusions

A survey has been carried out to analyse the variation, with time, of sound pressure levels within studios and control rooms. The results show that, with the advent of high powered amplifiers and loudspeaker systems, levels as high as 120 dB in one-third-octave bands may be encountered in studios used by pop groups. The levels experienced in control rooms depend very much at present on the whims of the programme operators;* the loudest control-room level encountered during this survey reached 101 dB in a one-third-octave band.

The results show a trend towards louder sound pressure levels than anticipated by PH-21, and therefore a review of the data in that document is justified.

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* NB All these results have been corrected for random incidence as discussed in Section 5.

* Bearing in mind the possible hearing damage that can result from long exposure to high-level sounds, it may be necessary to restrict the maximum allowable monitoring levels. This would ease the sound-insulation problems for control cubicles.

8. References

1. SMITH, T.J.B. *and* GILFORD, C.L.S. 1968. Airborne sound insulation requirements in studio centres. BBC Research Department Report No. PH-21, Serial No. 1968/35.
2. BRUEL *and* KJAER. Impulse precision sound level meter type 2204. Instruction and application handbook. Copenhagen, Bruel and Kjaer, 1970.

Appendix

Coding of the Graphs and Tables

This Appendix is divided into two parts. Part One contains the results for the studios and is given the code prefix 'A1'. Part Two contains the results for the control cubicles and recording channels and has the prefix 'A2'. Each studio type retains the type number given in Table 1 in the body of the report. Thus, in the results, a large drama studio has the number '5' following the prefix. The final component of the code number is either 'a' or 'b', for the typical results and worst-case results respectively. Thus the table number 'A2–6b' contains the worst case results obtained in the control cubicle of a small drama studio. Corresponding figures and tables are given the same code number.

The worst-case results for a type 2 studio (general purpose) given in table A1–2b exclude pop groups. If the effect of pop groups needs to be considered, then table A1–4b should be referred to.

The sound pressure levels experienced in the cubicles of large drama studios were found to vary very little from one recording session to the next, and so only a typical set of results 'A2–5' is presented. Further, monitoring levels for small drama studios and talks studios were very similar so the results for these two environments have been combined and are coded A1–6a/7a and A1–6b/7b.

Sound Pressure Level Analysis Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	71	69	65	62	1	1	1
63	83	79	75	72	69	65	61
79	90	85	79	78	75	68	63
99	96	92	88	85	79	75	70
125	95	92	89	87	82	78	71
157	95	93	89	87	80	75	70
198	92	89	86	83	80	76	72
250	93	91	86	84	78	75	72
315	90	88	86	83	80	77	73
397	92	89	86	85	81	77	72
500	90	88	86	83	80	78	73
630	90	88	86	84	79	76	74
794	90	88	83	82	78	75	71
1000	88	86	82	80	77	74	71
1260	86	85	82	80	77	74	71
1587	85	84	81	78	74	71	67
2000	85	83	79	77	72	70	65
2520	84	79	75	73	69	67	63
3175	82	76	72	71	68	65	1
4000	79	75	71	69	66	62	1
5040	76	70	66	65	1	1	1
6350	72	68	64	1	1	1	1
8000	69	1	1	1	1	1	1
10079	1	1	1	1	1	1	1
dBA equivalents	98	96	92	90	86	83	80

TABLE A1–1a

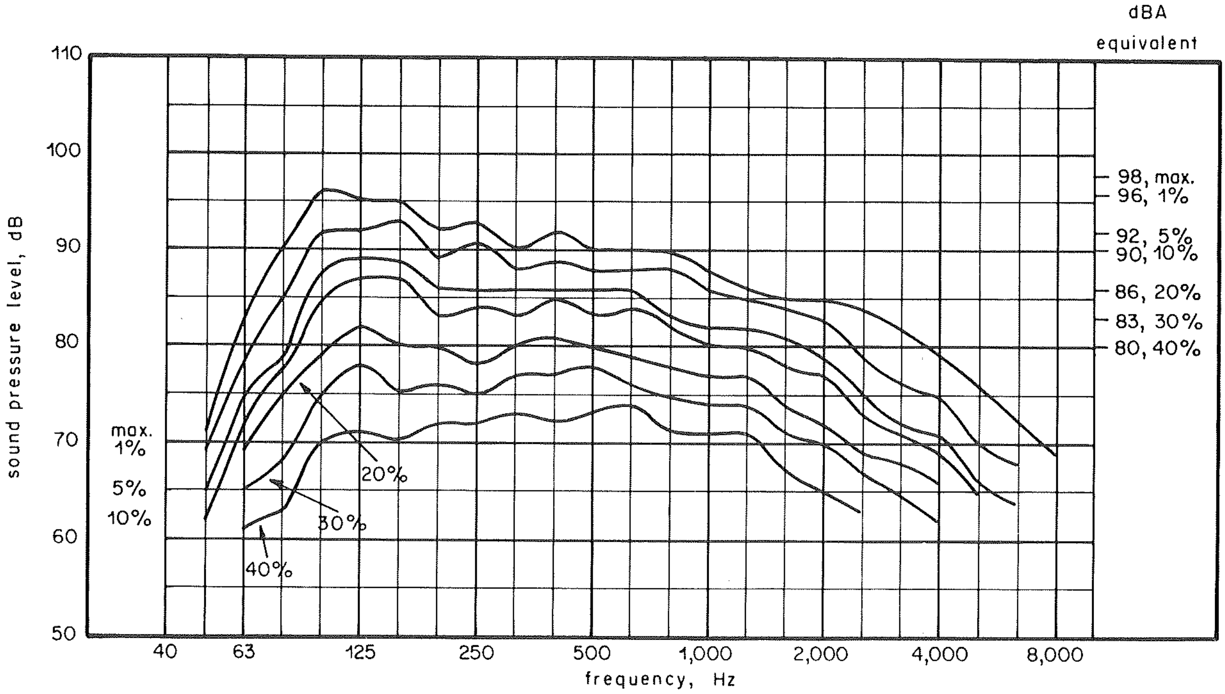

Fig. A1–1a

ORCHESTRAL MUSIC STUDIOS: TYPICAL RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Freq. Hz	Max	1%	5%	10%	20%	30%	40%
50	74	73	66	1	1	1	1
63	88	84	80	77	70	1	1
79	88	85	81	78	72	68	1
99	87	86	81	77	74	70	66
125	93	91	84	80	74	71	68
157	92	88	83	80	76	74	72
198	96	88	85	83	80	77	75
250	92	87	85	83	81	78	76
315	91	90	86	83	81	78	77
397	95	93	89	87	84	82	80
500	97	93	90	88	85	83	81
630	100	97	93	90	87	85	82
794	98	97	91	88	85	82	79
1000	95	93	88	86	83	80	77
1260	94	92	88	86	82	79	75
1587	91	88	85	82	78	75	71
2000	87	86	83	79	76	72	69
2520	96	86	82	77	74	71	68
3175	91	83	80	75	73	70	1
4000	84	77	74	71	68	1	1
5040	83	71	1	1	1	1	1
6350	83	1	1	1	1	1	1
8000	77	1	1	1	1	1	1
10079	72	1	1	1	1	1	1
dBA equivalents	105	102	97	95	91	89	86

TABLE A1–1b

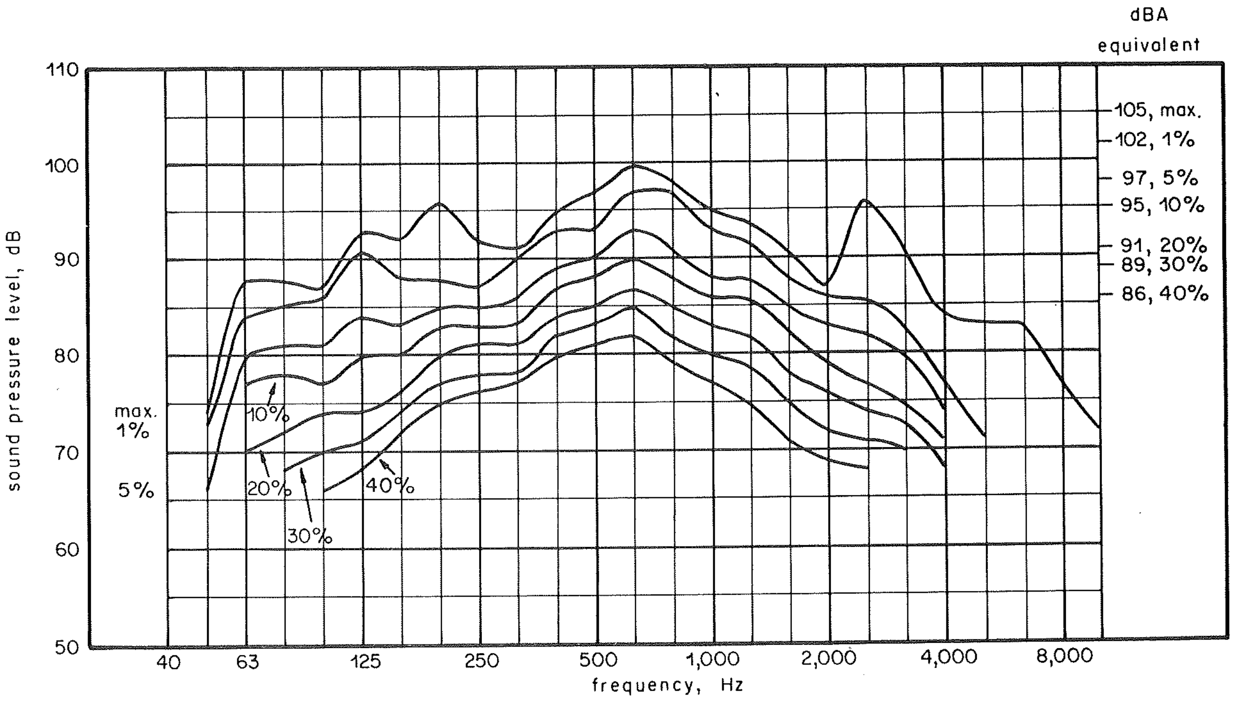

Fig. A1–1b

ORCHESTRAL MUSIC STUDIOS: WORST CASE RESULTS

Sound Pressure Level Analysis Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	72	70	62	1	1	1	1
63	79	77	74	69	1	1	1
79	79	76	72	70	66	1	1
99	92	88	81	76	68	64	1
125	91	86	82	77	73	68	64
157	89	87	81	78	73	70	69
198	89	84	81	78	73	70	68
250	89	85	81	79	75	72	70
315	90	87	82	80	78	75	74
397	90	87	82	81	77	75	73
500	90	88	84	81	78	77	75
630	94	92	88	85	82	78	76
794	100	95	89	85	81	78	74
1000	88	87	83	82	77	75	73
1260	92	91	84	79	76	73	71
1587	93	89	82	79	73	71	69
2000	89	83	79	76	73	70	67
2520	90	87	80	78	74	70	67
3175	89	85	81	79	75	70	67
4000	82	79	73	70	67	64	1
5040	78	69	66	1	1	1	1
6350	75	67	1	1	1	1	1
8000	69	67	1	1	1	1	1
10079	68	66	1	1	1	1	1
dBA equivalents	103	99	94	91	87	84	81

TABLE A1–2a

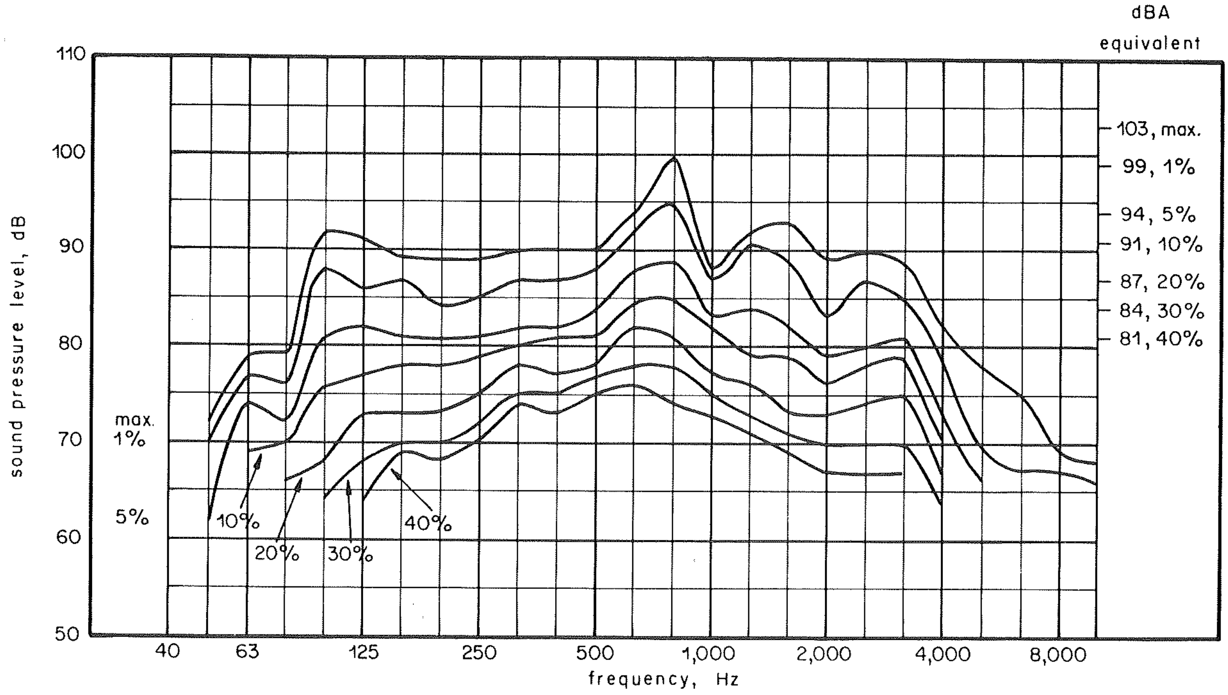

Fig. A1–2a

GENERAL PURPOSE STUDIOS: TYPICAL RESULTS

Sound Pressure Level Analysis Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	93	91	90	88	86	85	84
63	90	88	82	81	79	78	76
79	87	86	83	82	81	79	77
99	95	93	92	91	89	88	86
125	95	92	88	87	84	81	80
157	96	94	91	89	87	85	83
198	95	93	90	89	88	87	85
250	92	92	90	89	88	86	85
315	96	94	92	91	89	88	86
397	98	95	92	91	89	88	86
500	97	95	93	92	91	89	88
630	97	96	94	93	91	90	89
794	98	96	94	93	92	90	89
1000	99	97	95	93	90	88	87
1260	95	93	91	90	89	88	86
1587	92	91	90	89	88	86	85
2000	96	94	90	89	87	85	84
2520	92	90	87	86	84	82	81
3175	89	88	85	83	81	80	78
4000	83	82	81	80	78	76	75
5040	81	80	79	78	76	75	74
6350	86	80	77	76	74	73	72
8000	78	76	74	73	72	70	69
10079	74	73	71	70	1	1	1
dBA equivalents	105	103	101	100	98	97	96

TABLE A1–2b

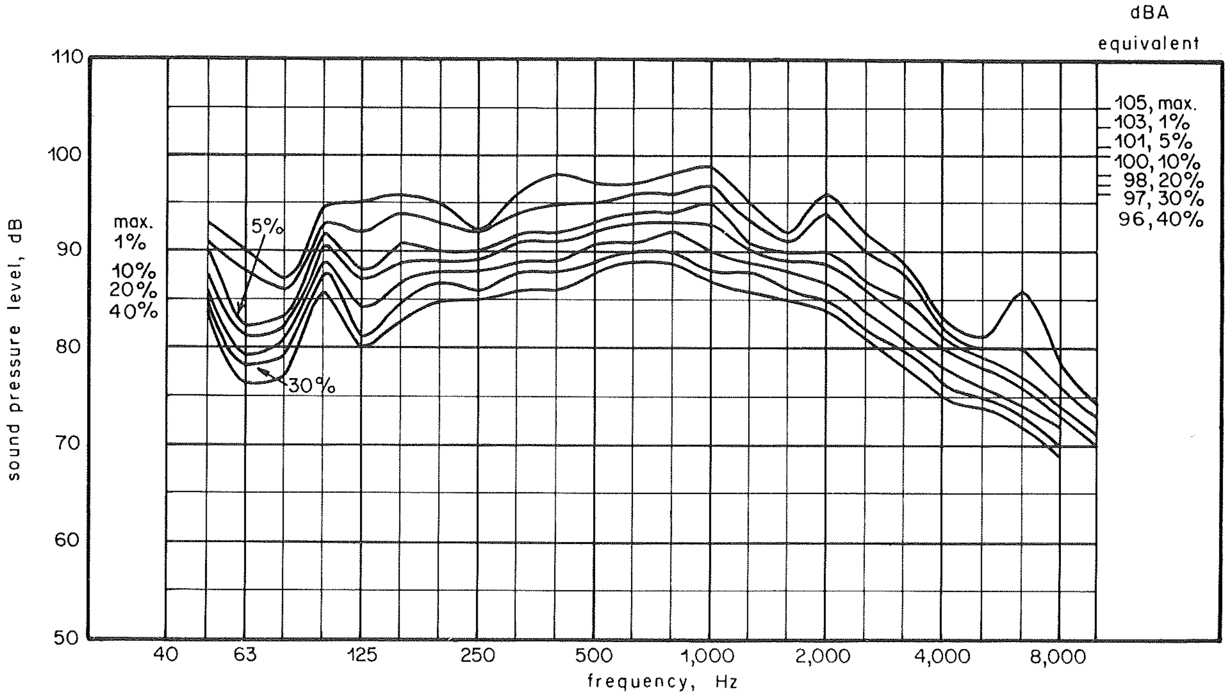

Fig. A1–2b

GENERAL PURPOSE STUDIOS: WORST CASE RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	61	59	58	57	54	1	1
63	68	57	1	1	1	1	1
79	63	62	54	52	1	1	1
99	70	69	66	64	57	53	52
125	67	65	61	56	53	51	1
157	75	65	61	59	56	55	53
198	85	77	72	70	67	65	63
250	84	79	71	68	65	64	62
315	78	77	74	71	68	64	62
397	88	83	81	80	76	70	68
500	87	82	79	77	74	70	67
630	89	86	79	76	71	68	65
794	82	80	77	75	70	66	64
1000	84	83	78	74	68	65	61
1260	86	80	74	72	67	62	59
1587	73	71	69	67	63	60	56
2000	74	70	67	66	63	60	56
2520	69	67	65	63	59	58	55
3175	66	65	64	61	59	56	54
4000	62	60	59	56	54	1	1
5040	58	55	1	1	1	1	1
6350	59	55	1	1	1	1	1
8000	57	1	1	1	1	1	1
10079	57	1	1	1	1	1	1
dBA equivalents	93	89	85	82	78	74	71

TABLE A1–3a

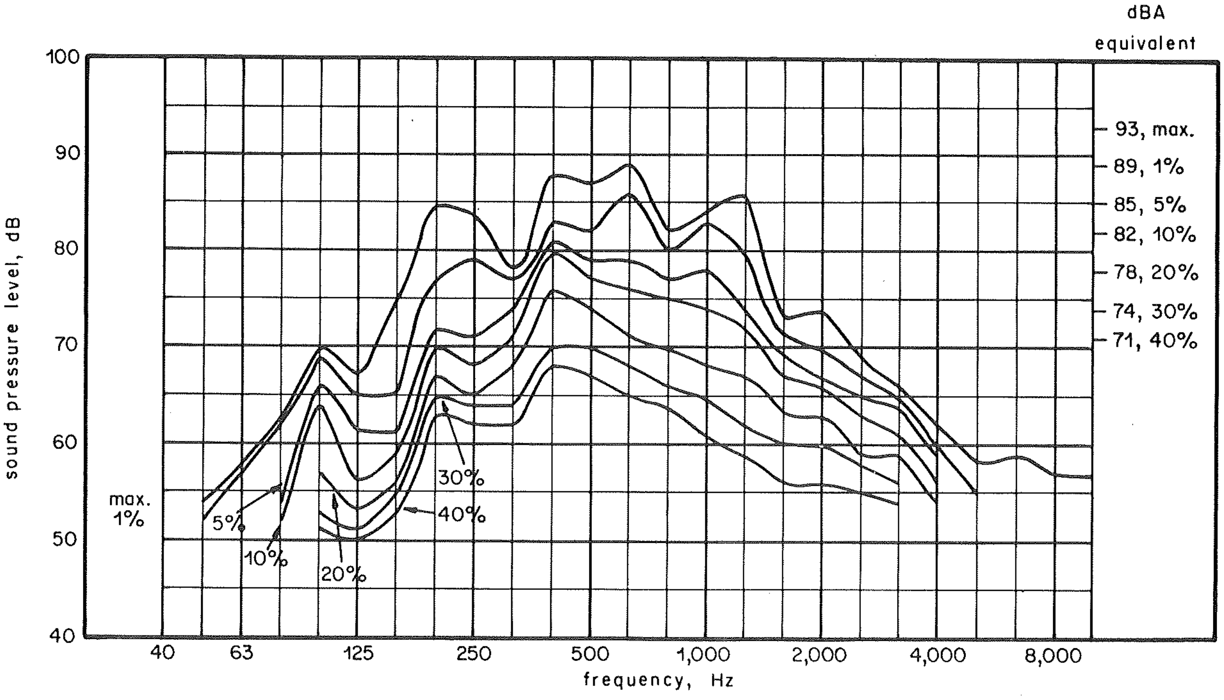

Fig. A1–3a

RECITAL STUDIOS: TYPICAL RESULTS

Sound Pressure Level Analysis Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	74	71	65	62	1	1	1
63	86	85	76	73	69	65	63
79	91	84	82	80	75	71	67
99	95	92	88	85	81	78	74
125	92	90	88	85	81	76	74
157	96	93	86	83	80	78	74
198	99	96	91	87	84	81	78
250	92	90	87	85	82	80	78
315	97	95	92	90	86	83	81
397	96	95	90	89	86	83	81
500	97	95	91	89	87	85	83
630	93	91	87	86	83	81	79
794	97	93	89	86	83	80	78
1000	99	92	88	85	81	79	77
1260	100	98	87	83	80	78	76
1587	97	89	82	79	76	74	71
2000	95	89	81	78	73	70	69
2520	90	83	76	71	67	65	1
3175	86	83	72	68	1	1	1
4000	78	74	68	65	1	1	1
5040	81	74	66	1	1	1	1
6350	74	68	1	1	1	1	1
8000	67	1	1	1	1	1	1
10079	1	1	1	1	1	1	1
dBA equivalents	106	103	96	94	90	88	86

TABLE A1–3b

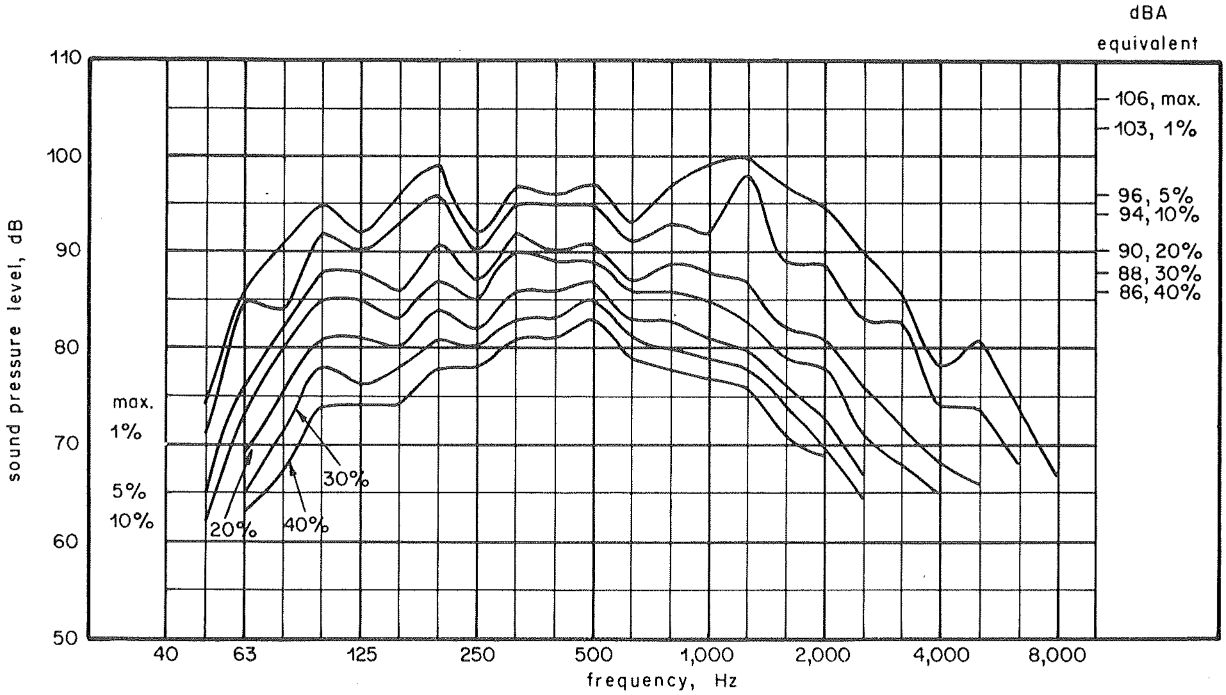

Fig. A1–3b

RECITAL STUDIOS: WORST CASE RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Run	Max	1%	5%	10%	20%	30%	40%
50	90	88	87	86	85	84	83
63	104	103	101	99	96	94	92
79	108	107	103	102	99	96	94
99	113	111	107	105	102	99	96
125	111	107	106	105	102	101	99
157	109	107	105	103	101	99	97
198	101	98	97	96	94	93	92
250	96	94	92	91	90	89	88
315	95	94	93	92	90	89	88
397	102	101	98	97	95	93	92
500	97	96	95	94	92	91	90
630	101	98	95	94	92	90	89
794	94	94	91	90	89	87	86
1000	89	89	87	86	84	83	81
1260	95	93	91	89	87	85	82
1587	93	92	90	88	85	84	82
2000	91	90	88	87	84	82	80
2520	97	94	89	87	84	82	79
3175	87	84	82	82	80	78	77
4000	85	82	79	79	77	75	1
5040	77	76	1	1	1	1	1
6350	1	1	1	1	1	1	1
8000	1	1	1	1	1	1	1
10079	1	1	1	1	1	1	1
dBA equivalents	107	104	102	101	98	97	95

TABLE A1–4a

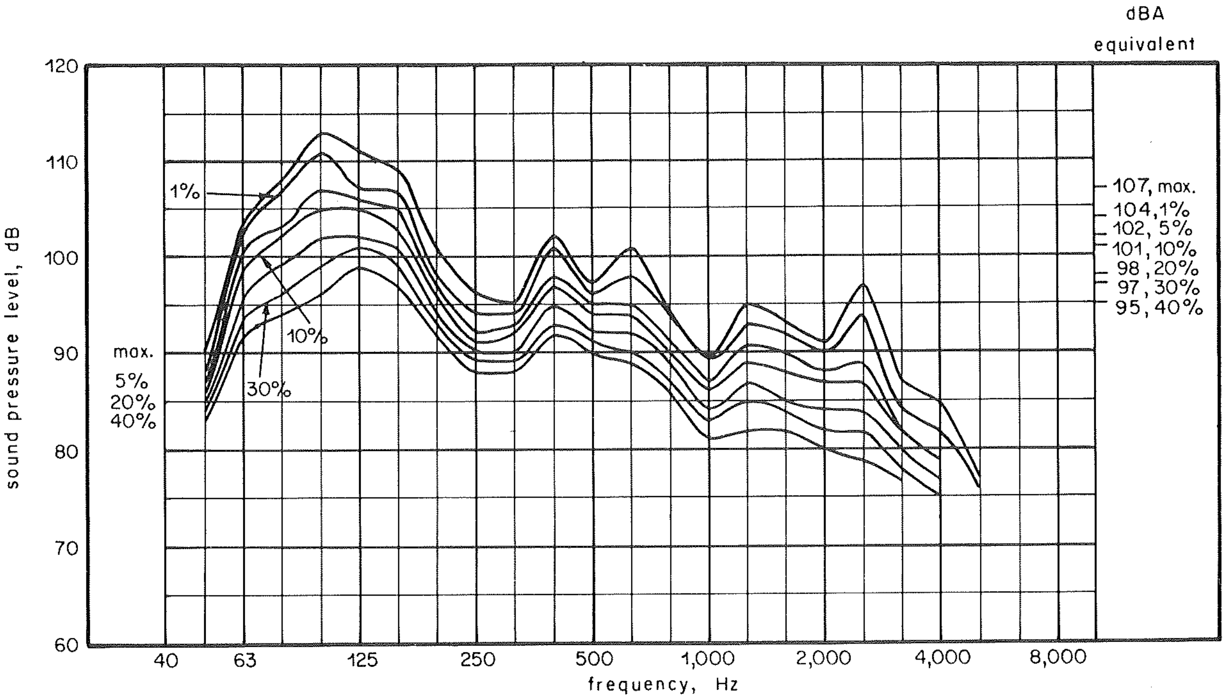

Fig. A1–4a

POP STUDIOS: TYPICAL RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Run	Max	1%	5%	10%	20%	30%	40%
50	90	90	88	88	87	86	85
63	104	103	99	96	93	92	90
79	114	111	110	109	107	106	102
99	117	115	111	109	105	103	102
125	120	119	114	111	107	105	104
157	116	115	112	111	109	108	107
198	116	114	112	110	108	106	104
250	112	111	109	108	106	104	103
315	113	111	110	108	106	105	104
397	107	105	103	101	100	99	98
500	106	104	102	100	98	97	97
630	109	107	104	102	100	99	98
794	113	106	104	102	100	99	98
1000	109	105	102	101	98	96	94
1260	106	104	98	96	94	93	92
1587	103	102	98	96	94	93	92
2000	103	102	99	98	96	95	94
2520	106	104	102	100	98	97	96
3175	99	97	96	95	94	93	92
4000	98	95	94	93	92	91	90
5040	94	92	91	90	89	88	87
6350	94	90	88	88	86	86	85
8000	88	86	86	1	1	1	1
10079	1	1	1	1	1	1	1
dBA equivalents	118	115	113	111	109	108	106

TABLE A1–4b

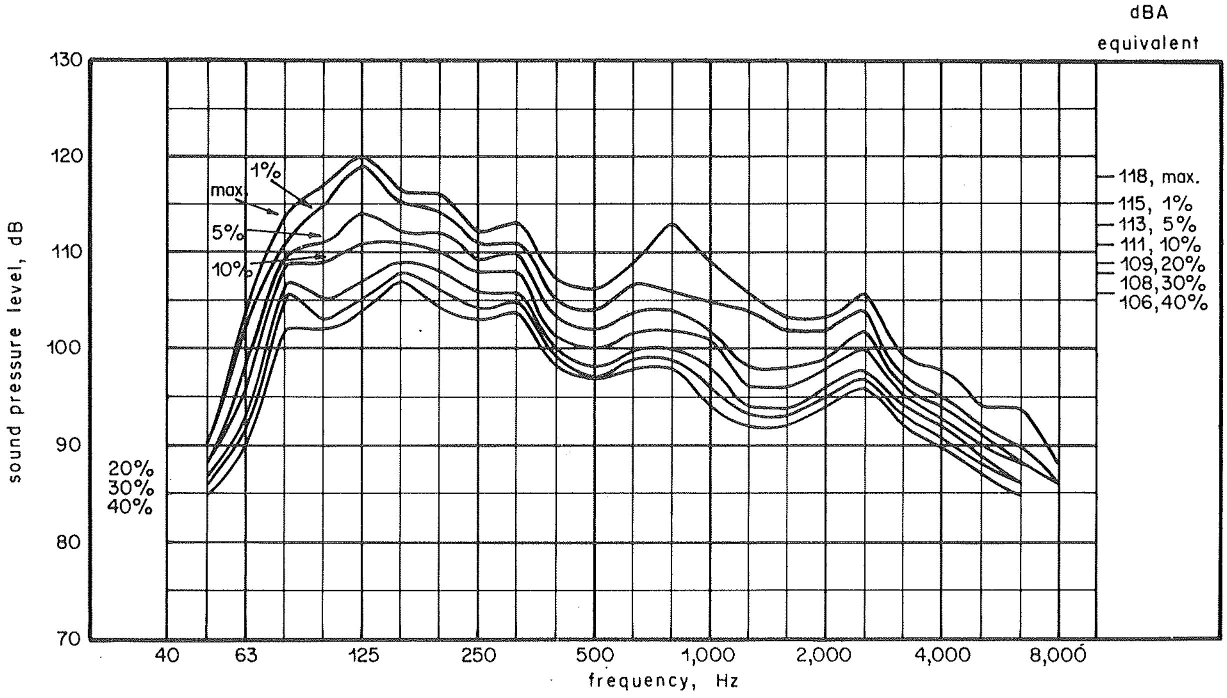

Fig. A1–4b

POP STUDIOS: WORST CASE RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	61	56	51	49	46	1	1
62	67	60	50	47	42	1	1
79	68	62	52	46	42	1	1
99	67	62	51	48	43	1	1
125	69	65	49	45	42	1	1
157	65	60	51	48	44	42	1
198	69	62	55	53	49	46	43
250	72	69	60	56	52	49	46
315	73	68	61	57	53	49	46
397	77	70	62	59	54	51	47
500	74	67	62	57	53	49	46
630	69	65	61	58	53	50	47
794	65	65	60	57	52	47	44
1000	70	68	59	55	50	45	1
1260	67	62	56	50	46	1	1
1587	71	60	52	48	42	1	1
2000	77	60	55	48	43	1	1
2520	64	60	51	45	1	1	1
3175	61	57	50	45	1	1	1
4000	60	56	50	1	1	1	1
5040	66	57	47	1	1	1	1
6350	64	59	1	1	1	1	1
8000	56	54	1	1	1	1	1
10079	52	1	1	1	1	1	1
dBA equivalents	81	74	67	63	58	54	50

TABLE A1–5a

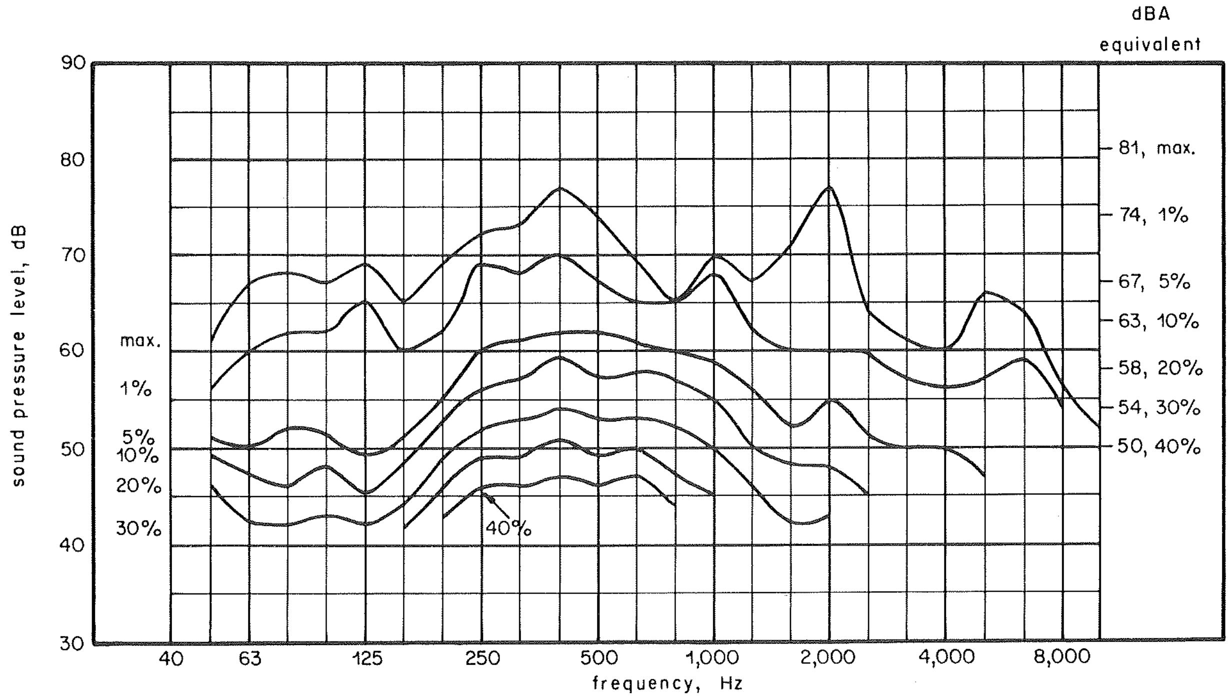

Fig. A1–5a

LARGE DRAMA STUDIOS: TYPICAL RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Run	Max	1%	5%	10%	20%	30%	40%
50	61	55	53	49	45	44	43
63	63	57	53	51	49	47	46
79	60	55	52	50	47	45	43
99	74	65	57	54	51	50	48
125	67	66	59	56	53	51	49
157	72	71	64	63	60	57	54
198	79	77	68	66	62	59	56
250	70	69	64	61	56	54	52
315	72	68	66	63	59	56	53
397	78	73	69	65	62	59	57
500	78	76	71	68	65	60	57
630	78	75	67	64	61	58	56
794	77	69	63	60	56	53	50
1000	66	65	61	58	55	52	49
1260	69	63	59	57	53	51	48
1587	71	65	61	59	56	53	50
2000	65	64	60	57	52	49	46
2520	65	61	57	55	50	45	1
3175	67	62	58	55	50	43	1
4000	64	60	54	51	47	41	1
5040	58	54	49	46	43	1	1
6350	56	54	48	45	1	1	1
8000	62	55	47	1	1	1	1
10079	54	50	1	1	1	1	1
dBA equivalents	83	79	73	71	67	63	61

TABLE A1–5b

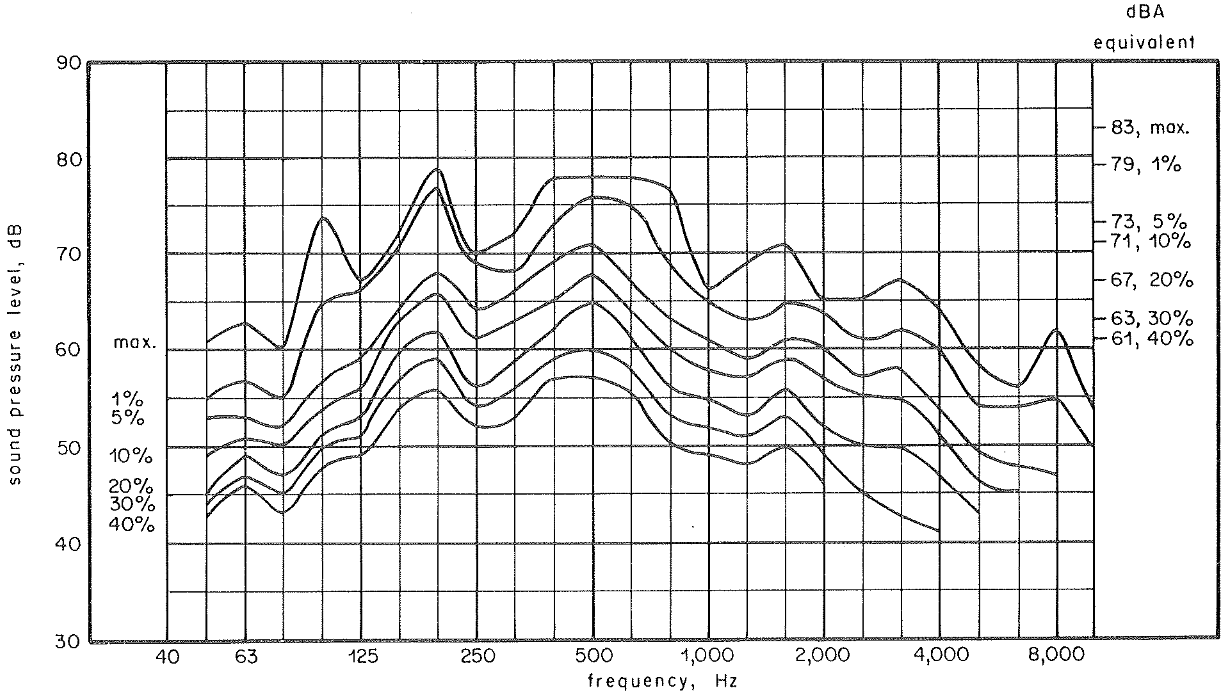

Fig. A1–5b

LARGE DRAMA STUDIOS: WORST CASE RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	62	57	54	52	49	48	47
63	56	53	50	48	46	45	44
79	52	47	44	43	41	39	38
99	49	45	40	39	36	35	33
125	50	45	41	39	37	35	34
157	55	52	48	46	42	39	37
198	61	59	54	51	47	43	39
250	62	59	56	54	49	44	41
315	64	61	57	53	47	44	40
397	58	55	52	49	44	41	38
500	61	57	51	48	45	42	39
630	57	53	50	47	43	40	38
794	58	56	50	48	44	42	39
1000	55	53	49	48	43	40	36
1260	57	55	48	44	39	35	31
1587	61	57	49	41	36	33	31
2000	61	60	50	41	36	34	31
2520	59	54	46	40	34	31	29
3175	56	53	48	39	35	33	30
4000	55	52	46	34	30	29	27
5040	55	55	45	38	31	27	25
6350	56	54	46	39	33	30	27
8000	55	52	43	39	32	29	27
10079	57	52	42	35	31	29	29
dBA equivalents	70	66	60	56	51	48	45

TABLE A1–6a

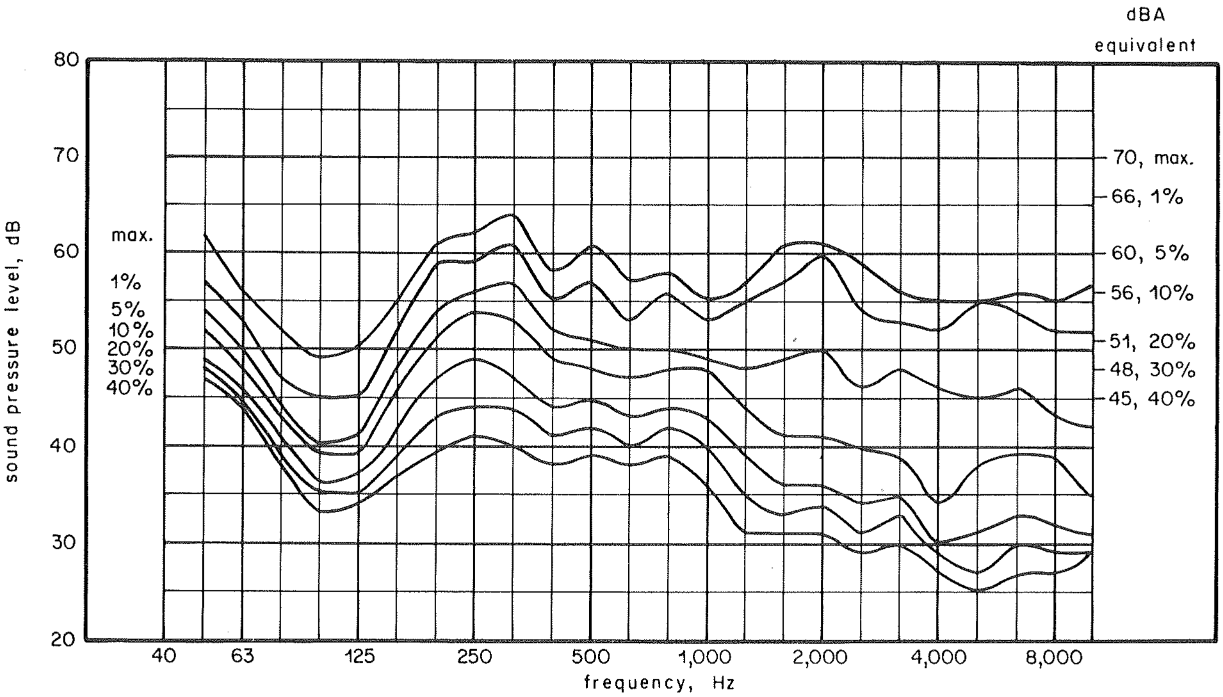

Fig. A1–6a

SMALL DRAMA STUDIOS: TYPICAL RESULTS

Sound Pressure Level Analysis Level Exceeded x% of the Time

Freq. Hz	Max	1%	5%	10%	20%	30%	40%
50	67	64	59	56	53	52	51
63	60	59	55	52	49	48	46
79	62	51	48	46	44	42	41
99	62	55	52	50	47	45	42
125	61	55	53	51	49	46	43
157	66	64	60	58	54	52	50
198	68	67	62	61	57	54	51
250	68	66	62	59	55	51	49
315	63	61	56	54	51	49	46
397	71	67	64	62	58	55	53
500	67	64	59	57	54	51	48
630	70	67	64	59	53	49	43
794	69	65	61	58	53	48	44
1000	62	58	54	51	46	44	40
1260	63	59	54	51	47	43	40
1587	58	55	51	48	44	41	37
2000	61	55	49	45	40	37	1
2520	56	51	46	43	40	37	1
3175	50	48	44	41	38	1	1
4000	52	49	45	43	39	1	1
5040	52	50	45	41	38	1	1
6350	54	51	44	41	1	1	1
8000	53	52	44	41	1	1	1
10079	52	46	41	1	1	1	1
dBA equivalents	75	71	67	64	59	56	53

TABLE A1–6b

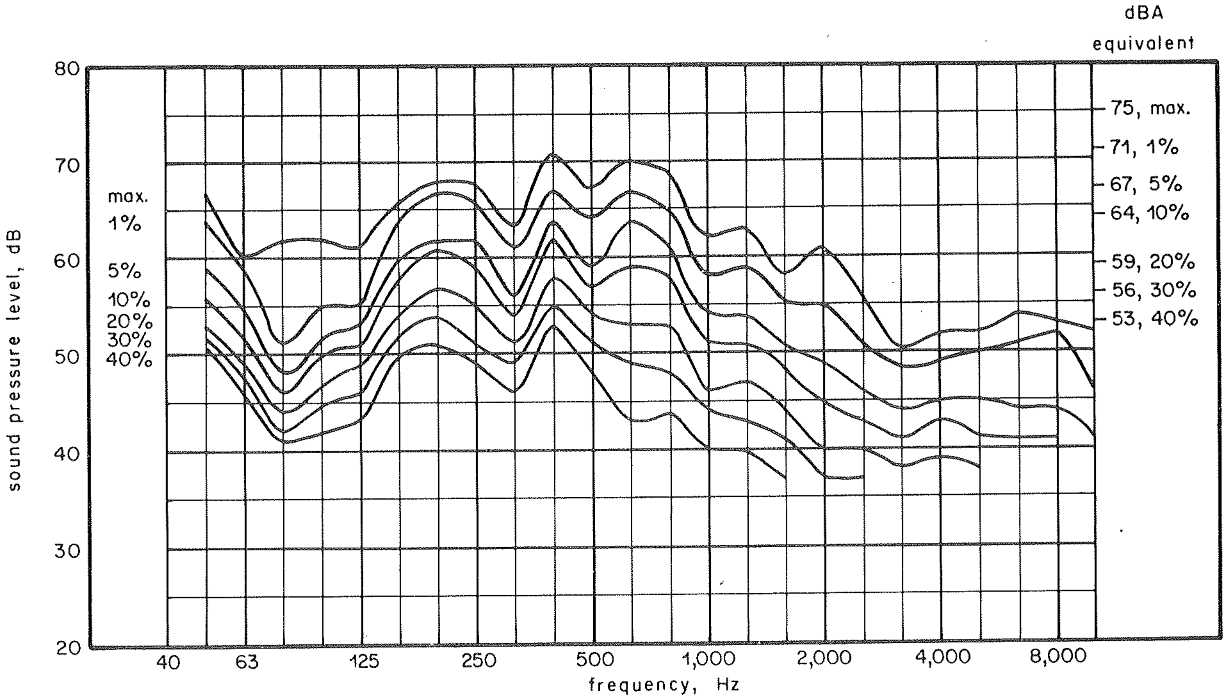

Fig. A1–6b

SMALL DRAMA STUDIOS: WORST CASE RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	52	49	47	45	44	42	41
63	48	47	46	45	42	41	1
79	58	50	46	44	42	40	1
99	60	53	51	49	47	45	44
125	66	62	60	59	57	53	51
157	70	66	61	58	54	52	50
198	65	62	59	57	54	52	50
250	68	67	62	59	55	52	50
315	70	65	61	57	54	52	50
397	68	64	59	56	53	51	49
500	71	66	62	58	56	53	51
630	68	65	61	58	55	52	49
794	73	63	56	53	49	47	43
1000	61	59	52	49	45	42	1
1260	58	57	53	48	45	41	1
1587	64	57	51	47	43	1	1
2000	62	54	51	47	41	1	1
2520	55	52	49	46	42	1	1
3175	56	50	44	1	1	1	1
4000	54	49	46	43	1	1	1
5040	50	49	1	1	1	1	1
6350	51	48	1	1	1	1	1
8000	52	48	1	1	1	1	1
10079	48	1	1	1	1	1	1
dBA equivalents	76	70	66	62	59	56	53

TABLE A1–7a

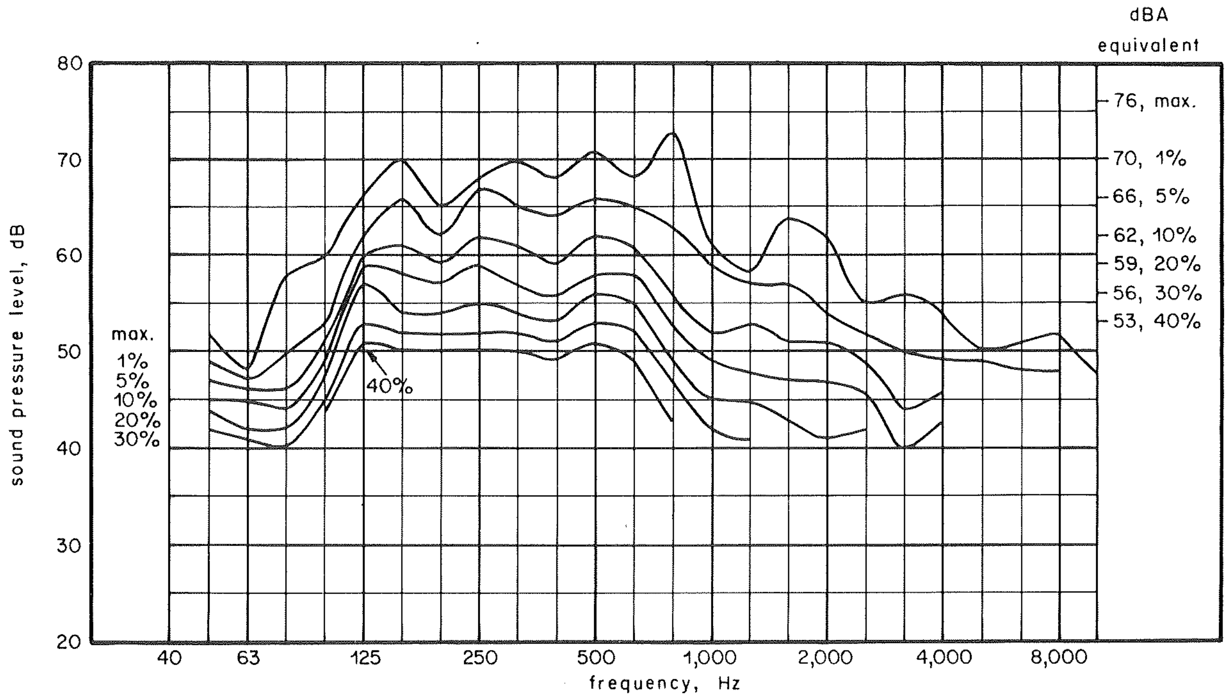

Fig. A1–7a

TALKS STUDIOS: TYPICAL RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	67	58	55	53	51	50	49
63	62	52	48	47	45	1	1
79	65	63	55	53	50	48	46
99	65	65	60	58	53	52	50
125	68	66	62	60	56	54	53
157	68	66	63	60	52	50	47
198	74	72	65	62	57	53	50
250	70	69	66	63	60	57	55
315	73	72	66	65	58	53	51
397	75	73	69	66	62	59	57
500	74	71	67	62	60	57	55
630	73	71	63	60	57	54	52
794	69	66	60	56	52	49	46
1000	71	68	61	57	52	47	44
1260	75	68	60	56	50	46	42
1587	77	67	62	58	50	45	40
2000	73	71	66	61	56	47	1
2520	80	76	69	66	60	50	1
3175	73	69	63	60	55	46	1
4000	68	67	63	60	51	1	1
5040	69	66	60	56	48	1	1
6350	63	59	55	49	1	1	1
8000	61	58	52	1	1	1	1
10079	53	1	1	1	1	1	1
dBA equivalents	85	81	75	71	66	61	57

TABLE A1–7b

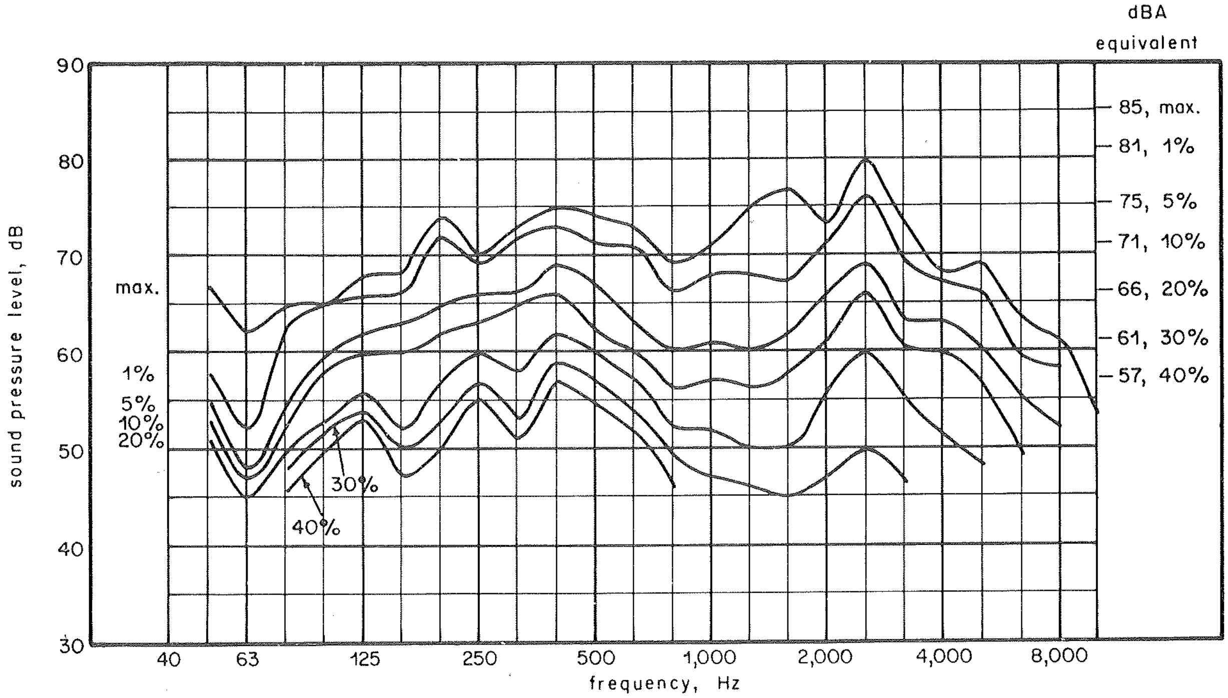

Fig. A1–7b

TALKS STUDIOS: WORST CASE RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	78	74	68	66	63	60	56
63	82	77	73	71	68	66	62
79	90	86	80	78	76	72	70
99	87	81	79	77	74	72	68
125	87	84	79	77	74	72	68
157	85	79	76	74	71	69	66
198	84	81	77	75	73	70	69
250	88	83	81	78	75	72	69
315	86	81	78	75	72	70	67
397	85	83	76	75	71	70	68
500	74	73	71	69	65	63	61
630	78	77	74	72	67	65	63
794	86	79	77	74	71	68	65
1000	81	79	76	73	69	65	63
1260	80	78	75	72	67	65	63
1587	78	74	69	67	65	62	60
2000	77	75	70	68	66	64	62
2520	81	74	69	66	64	62	60
3175	77	75	70	68	65	62	60
4000	74	73	70	66	63	61	58
5040	69	68	63	61	58	1	1
6350	63	61	1	1	1	1	1
8000	62	1	1	1	1	1	1
10079	1	1	1	1	1	1	1
dBA equivalents	91	87	84	81	78	75	73

TABLE A1–8a

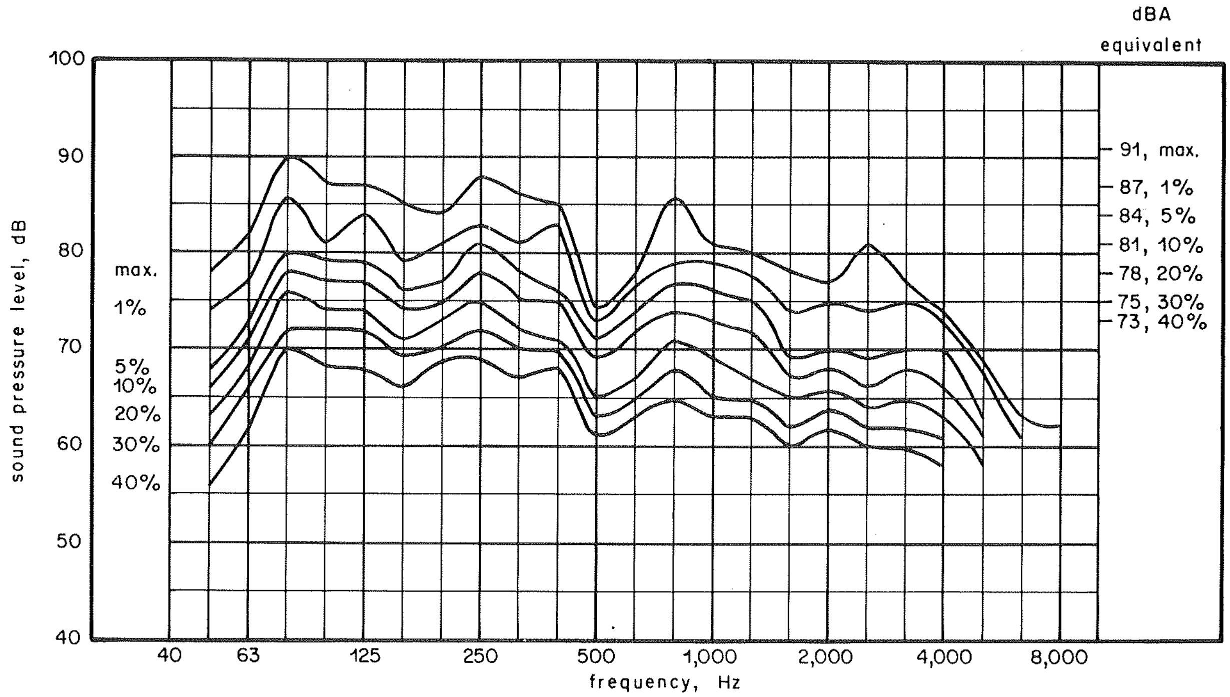

Fig. A1–8a

CONTINUITY STUDIOS (POP): TYPICAL RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	75	73	70	66	63	61	58
63	82	80	75	73	69	65	62
79	87	83	77	73	69	66	63
99	83	81	77	74	69	66	63
125	89	88	83	80	75	71	67
157	83	83	80	77	73	70	67
198	92	89	84	81	77	73	70
250	84	80	75	72	70	66	64
315	82	79	73	71	67	64	61
397	85	83	79	76	72	69	65
500	93	83	79	77	73	70	67
630	91	89	83	79	76	73	70
794	88	86	81	77	73	70	67
1000	84	78	74	72	68	65	63
1260	87	84	78	75	71	67	65
1587	83	81	76	73	70	68	65
2000	85	84	80	77	72	70	66
2520	79	77	74	73	70	68	65
3175	80	80	77	75	72	69	65
4000	83	81	78	76	73	69	66
5040	79	78	75	73	69	66	63
6350	76	74	70	68	65	62	1
8000	72	69	64	62	1	1	1
10079	64	63	1	1	1	1	1
dBA equivalents	97	93	89	86	82	79	76

TABLE A1–8b

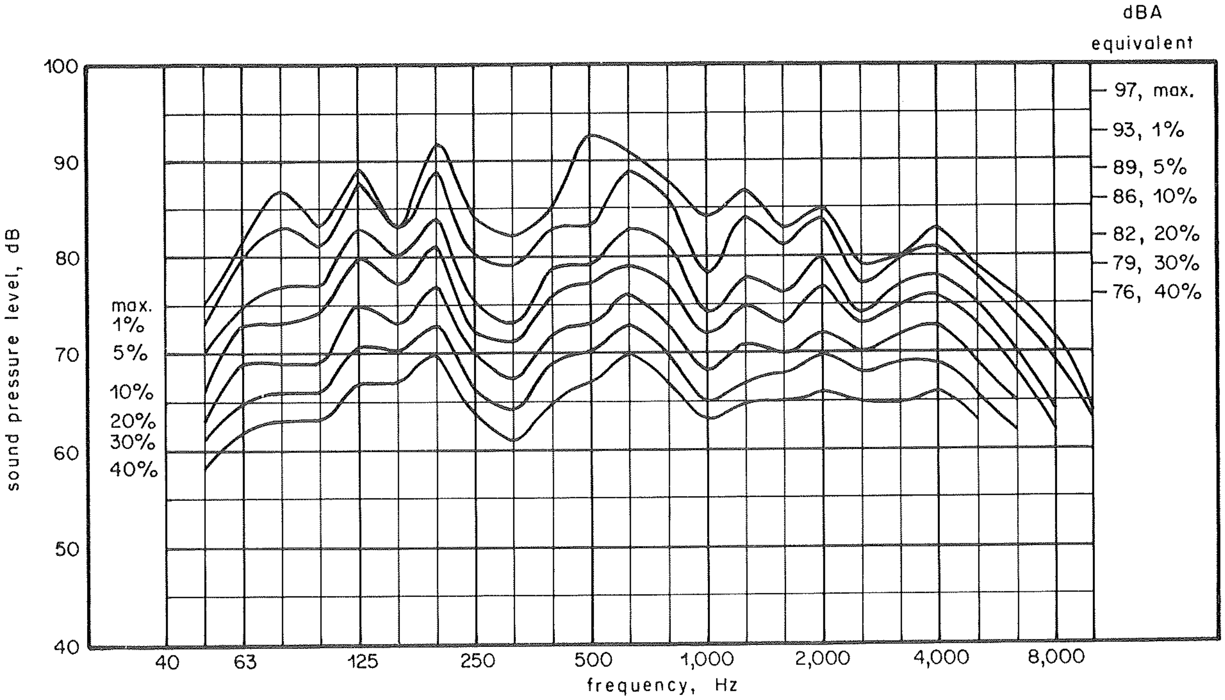

Fig. A1–8b

CONTINUITY STUDIOS (POP): WORST CASE RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Run	Max	1%	5%	10%	20%	30%	40%
50	81	76	66	60	57	54	52
63	89	87	79	72	65	61	58
79	84	79	71	67	61	56	52
99	82	75	70	64	60	56	53
125	81	78	72	67	62	59	56
157	80	70	66	64	60	57	54
198	79	77	72	69	65	60	59
250	83	79	74	72	68	65	63
315	85	84	78	76	73	71	68
397	87	83	78	75	73	70	67
500	89	86	80	77	73	70	68
630	84	80	77	75	71	68	65
794	88	80	77	74	71	68	66
1000	79	79	75	73	69	66	64
1260	80	79	73	71	68	66	63
1587	79	78	72	71	68	64	61
2000	82	73	70	69	64	62	59
2520	75	73	68	66	62	59	55
3175	73	71	68	66	61	58	55
4000	77	73	69	66	62	58	56
5040	77	70	65	63	60	59	55
6350	72	68	63	61	59	57	56
8000	64	62	58	1	1	1	1
10079	63	59	1	1	1	1	1
dBA equivalents	93	89	84	82	79	75	73

TABLE A2–1a

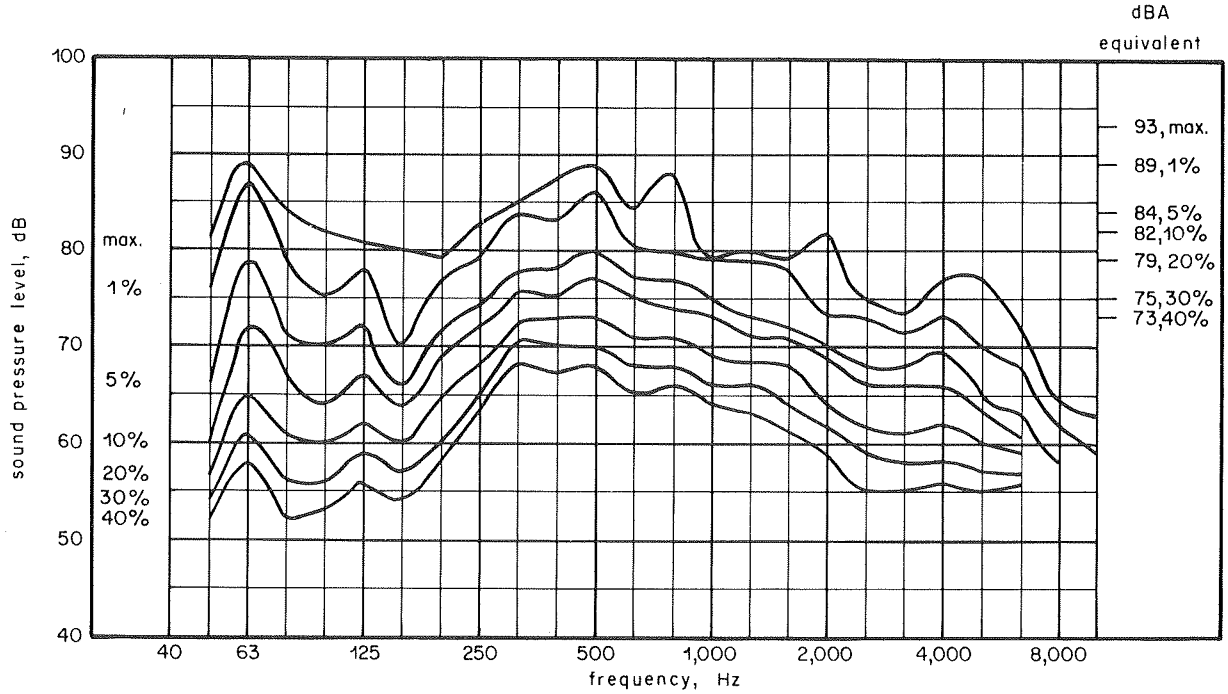

Fig. A2–1a

CONTROL ROOM TO ORCHESTRAL MUSIC STUDIO: TYPICAL RESULTS

Sound Pressure Level Analysis Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	88	83	81	78	75	72	69
63	91	89	85	83	80	78	75
79	96	94	86	84	80	77	74
99	93	92	89	85	82	80	78
125	98	97	91	88	85	82	79
157	96	90	87	85	84	82	80
198	94	92	88	86	84	83	81
250	91	89	86	85	83	82	80
315	89	89	86	83	80	78	76
397	92	90	87	85	83	80	79
500	95	91	88	85	82	79	77
630	96	91	85	84	81	79	77
794	91	89	87	85	81	79	77
1000	95	91	89	87	84	80	78
1260	85	84	82	80	76	74	72
1587	84	83	81	78	74	73	71
2000	87	84	80	78	75	73	71
2520	84	80	75	73	72	69	68
3175	82	81	76	74	72	70	68
4000	83	80	76	74	71	70	67
5040	79	79	73	70	68	1	1
6350	83	77	72	69	1	1	1
8000	74	73	1	1	1	1	1
10079	1	1	1	1	1	1	1
dBA equivalents	101	97	94	92	89	86	85

TABLE A2–1b

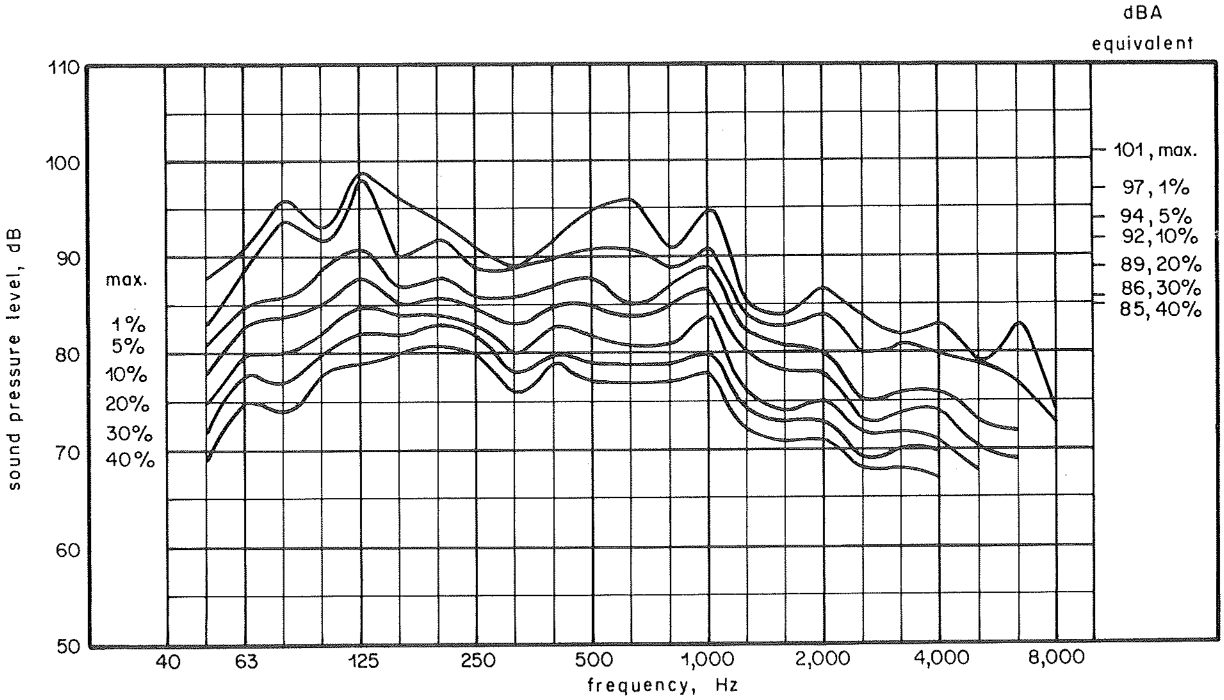

Fig. A2–1b

CONTROL ROOM TO ORCHESTRAL MUSIC STUDIO: WORST CASE RESULTS

Sound Pressure Level Analysis Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	87	85	82	80	78	75	72
63	93	91	86	85	82	80	77
79	100	96	90	88	85	82	79
99	100	95	92	90	86	83	81
125	87	85	82	79	77	75	74
157	84	81	78	76	71	69	67
198	80	78	76	74	72	69	67
250	91	88	84	82	79	77	74
315	96	89	87	83	81	78	76
397	92	91	88	86	82	80	78
500	85	81	78	76	74	72	69
630	82	81	78	76	73	70	68
794	87	85	81	78	75	72	70
1000	88	83	80	78	75	72	68
1260	79	77	75	73	70	65	63
1587	87	85	81	80	75	72	68
2000	86	84	82	79	74	70	66
2520	85	83	79	76	71	65	62
3175	84	81	79	76	69	64	61
4000	83	79	76	73	68	64	62
5040	77	74	69	68	62	1	1
6350	74	73	69	66	62	1	1
8000	70	69	64	1	1	1	1
10079	1	1	1	1	1	1	1
dBA equivalents	97	94	91	88	85	82	79

TABLE A2–2a

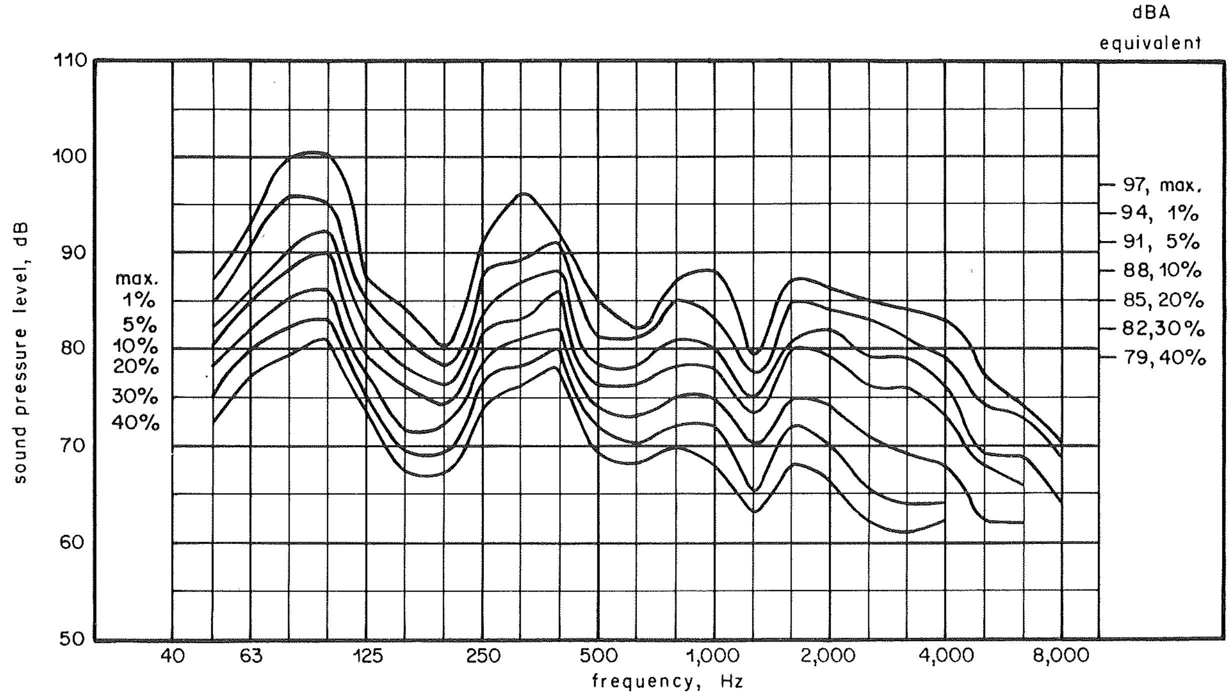

Fig. A2–2a

CONTROL ROOM TO GENERAL PURPOSE STUDIO: TYPICAL RESULTS

Sound Pressure Level Analysis Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	80	77	73	71	67	66	1
63	90	88	85	82	78	75	73
79	87	84	81	78	74	71	69
99	87	86	81	78	73	69	67
125	94	90	83	81	78	74	71
157	95	92	85	81	78	77	74
198	93	92	88	86	83	82	79
250	90	88	83	82	80	78	76
315	93	92	88	84	81	78	77
397	98	92	89	86	84	81	78
500	98	96	92	89	86	84	82
630	98	96	92	89	86	83	82
794	90	90	87	85	81	79	76
1000	100	95	88	86	82	78	75
1260	101	98	90	87	84	81	78
1587	89	87	85	82	79	77	74
2000	88	87	84	82	80	77	72
2520	86	85	81	80	77	74	70
3175	86	84	79	77	74	70	1
4000	85	84	78	75	71	68	1
5040	82	81	75	69	1	1	1
6350	80	77	69	1	1	1	1
8000	81	74	1	1	1	1	1
10079	79	1	1	1	1	1	1
dBA equivalents	106	103	97	95	91	89	86

TABLE A2–2b

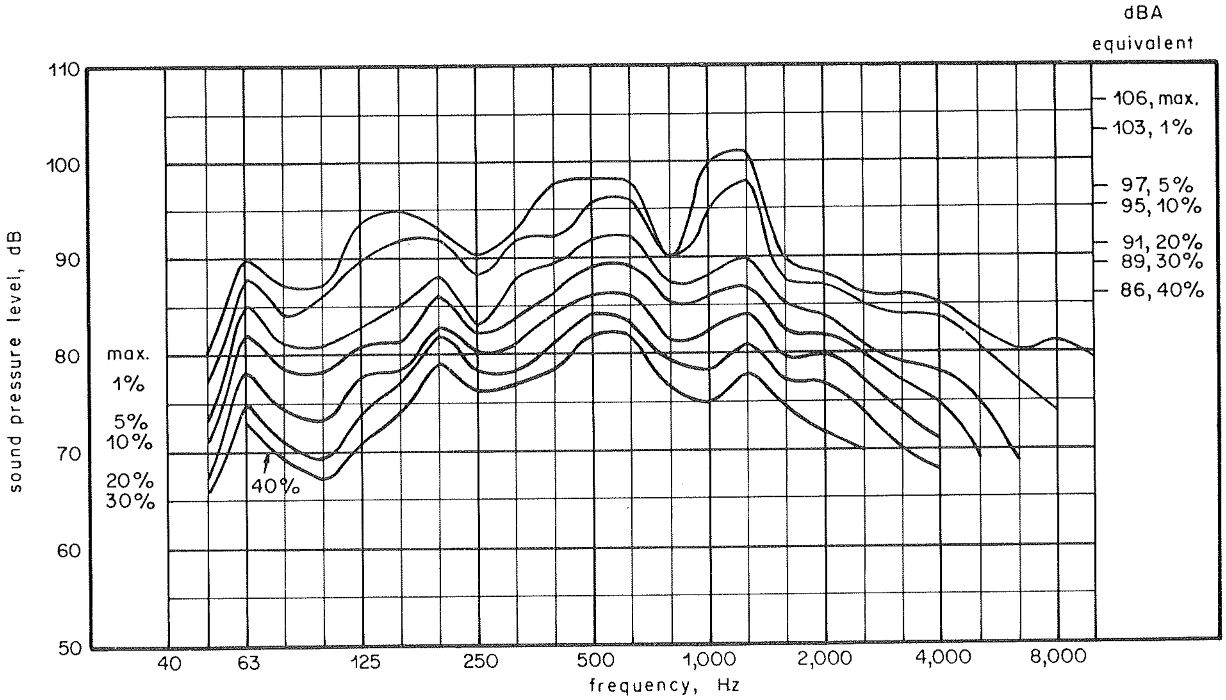

Fig. A2–2b

CONTROL ROOM TO GENERAL PURPOSE STUDIO: WORST CASE RESULTS

Sound Pressure Level Analysis Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	1	1	1	1	1	1	1
63	1	1	1	1	1	1	1
79	54	1	1	1	1	1	1
99	56	1	1	1	1	1	1
125	55	1	1	1	1	1	1
157	62	58	1	1	1	1	1
198	79	75	68	63	59	54	1
250	76	74	73	69	65	61	57
315	76	75	70	68	64	62	58
397	80	77	74	72	69	65	61
500	81	78	73	70	67	65	63
630	72	71	68	65	63	61	58
794	73	71	67	65	61	57	55
1000	76	67	63	60	57	54	1
1260	72	67	64	62	58	56	1
1587	78	72	69	67	64	62	59
2000	80	75	72	70	67	65	63
2520	71	70	65	62	59	57	55
3175	68	66	62	61	59	57	1
4000	65	63	60	1	1	1	1
5040	63	61	59	1	1	1	1
6350	60	1	1	1	1	1	1
8000	59	1	1	1	1	1	1
10079	1	1	1	1	1	1	1
dBA equivalents	86	82	79	76	73	71	67

TABLE A2–3a

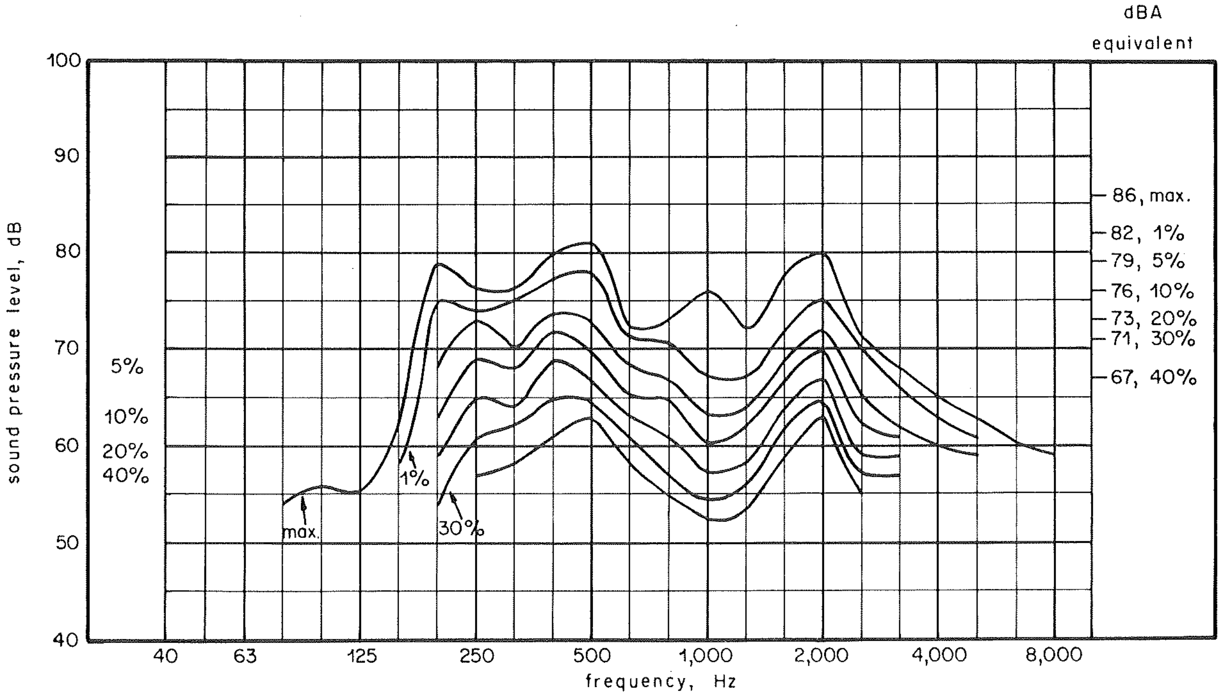

Fig. A2–3a

CONTROL ROOM TO RECITAL STUDIO: TYPICAL RESULTS

Sound Pressure Level Analysis Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	60	1	1	1	1	1	1
63	62	61	58	1	1	1	1
79	58	57	54	1	1	1	1
99	63	61	56	1	1	1	1
125	64	60	54	1	1	1	1
157	74	65	61	59	56	1	1
198	88	82	76	73	71	68	65
250	89	83	78	76	71	68	67
315	86	81	75	73	70	68	65
397	83	81	79	77	74	71	68
500	87	83	76	74	71	69	66
630	83	77	72	69	67	65	62
794	78	76	71	68	64	62	60
1000	77	73	66	64	61	59	56
1260	73	70	66	64	61	59	56
1587	76	73	69	66	64	62	60
2000	78	76	73	71	68	66	63
2520	76	71	68	66	63	61	59
3175	72	70	65	64	62	61	59
4000	66	65	63	61	59	1	1
5040	65	62	60	1	1	1	1
6350	63	60	1	1	1	1	1
8000	61	1	1	1	1	1	1
10079	1	1	1	1	1	1	1
dBA equivalents	90	86	81	79	76	74	71

TABLE A2–3b

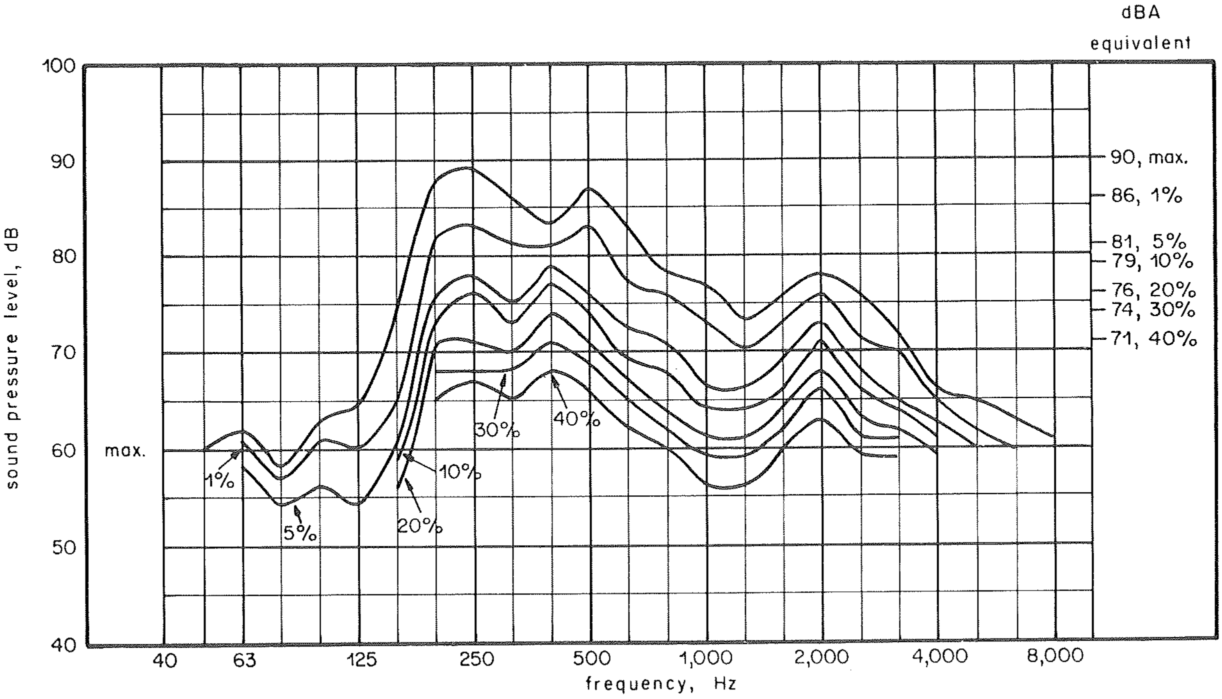

Fig. A2–3b

CONTROL ROOM TO RECITAL STUDIO: WORST CASE RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Run	Max	1%	5%	10%	20%	30%	40%
50	92	90	87	86	82	79	76
63	95	93	91	89	85	83	79
79	93	91	89	86	83	80	77
99	97	94	88	86	81	79	76
125	99	97	93	90	85	82	76
157	90	89	86	83	79	75	72
198	80	79	77	75	73	71	69
250	90	88	84	82	80	77	74
315	88	84	81	79	76	72	69
397	95	91	86	84	81	78	75
500	90	88	84	82	79	76	72
630	88	86	83	80	77	74	70
794	85	84	80	77	74	71	67
1000	91	87	82	79	75	71	67
1260	90	88	82	79	75	72	68
1587	95	90	83	80	77	74	70
2000	90	88	83	80	75	72	67
2520	88	83	79	77	73	70	65
3175	85	84	80	78	74	71	67
4000	84	82	79	77	72	68	65
5040	77	75	73	71	67	64	59
6350	77	76	72	69	64	61	1
8000	76	72	70	68	64	1	1
10079	71	69	67	64	1	1	1
dBA equivalents	101	98	93	90	86	83	79

TABLE A2–4a

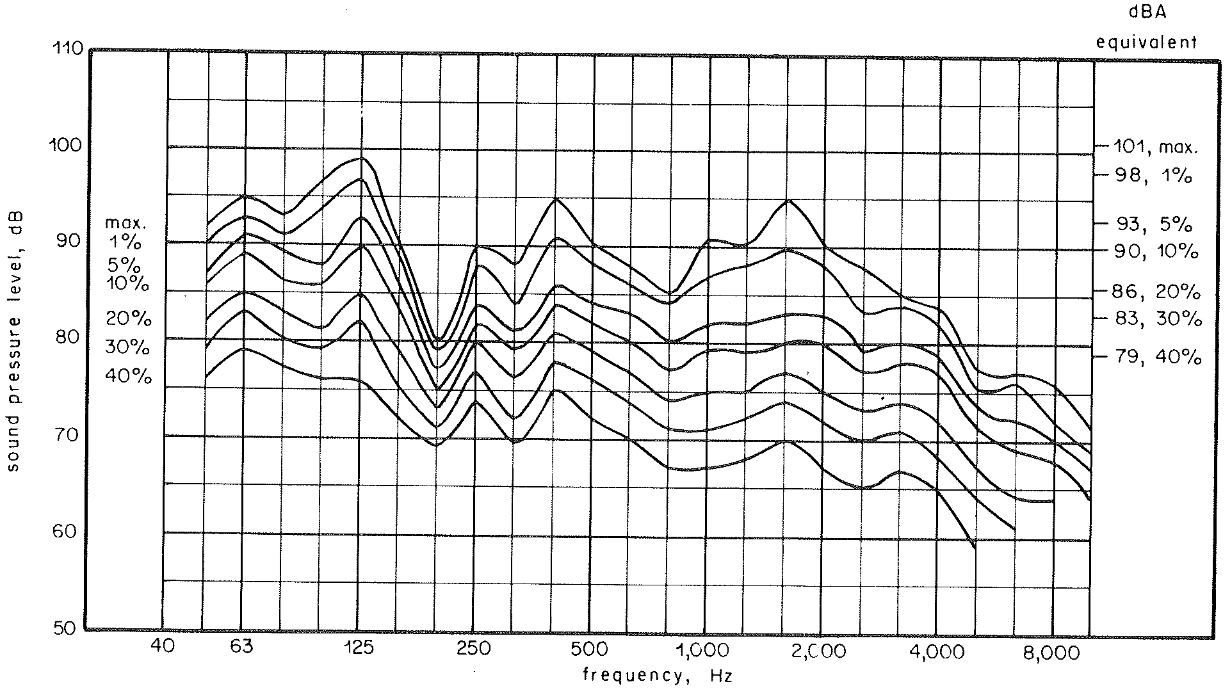

Fig. A2–4a

CONTROL ROOM TO POP STUDIO: TYPICAL RESULTS

Sound Pressure Level Analysis		Level Exceeded x% of the Time					
Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	82	75	71	69	64	62	60
63	88	84	80	77	71	68	65
79	93	91	85	83	80	78	77
99	95	94	92	90	86	84	80
125	94	92	88	84	81	79	76
157	96	93	86	83	79	77	75
198	92	89	85	83	81	79	77
250	92	91	87	83	81	80	78
315	96	92	86	84	79	76	73
397	96	92	89	87	84	80	78
500	93	92	88	87	83	80	78
630	88	87	84	83	78	76	73
794	91	89	86	84	80	77	75
1000	95	94	89	85	81	79	76
1260	90	86	82	79	77	75	72
1587	95	92	88	85	80	78	76
2000	90	88	84	82	76	74	72
2520	89	86	81	77	75	72	69
3175	92	86	80	77	73	70	68
4000	87	83	78	75	71	68	65
5040	89	80	75	73	68	65	61
6350	84	78	74	72	68	64	61
8000	80	76	70	68	63	1	1
10079	76	73	64	62	1	1	1
dBA equivalents	103	100	96	93	89	86	84

TABLE A2–4b

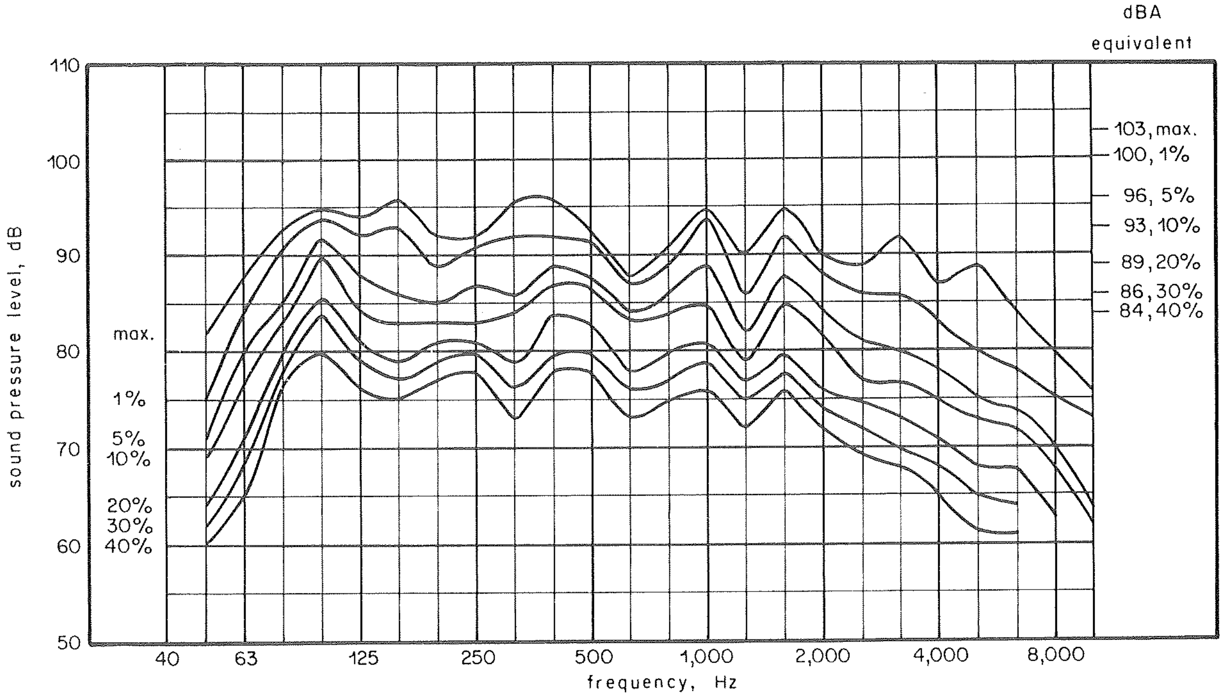

Fig. A2–4b

CONTROL ROOM TO POP STUDIO: WORST CASE RESULTS

Sound Pressure Level Analysis Level Exceeded x% of the Time

Run	Max	1%	5%	10%	20%	30%	40%
50	51	49	1	1	1	1	1
63	53	50	1	1	1	1	1
79	61	60	48	1	1	1	1
99	71	64	54	50	48	47	46
125	80	69	64	58	52	49	47
157	69	65	61	58	53	50	47
198	78	73	67	63	59	55	52
250	76	75	69	67	64	61	57
315	79	78	74	71	67	62	59
397	79	76	71	65	61	57	54
500	81	75	71	66	62	59	56
630	82	75	69	66	62	57	54
794	74	73	66	61	57	52	49
1000	82	72	67	61	57	52	47
1260	82	74	67	61	56	51	48
1587	77	75	65	60	55	51	48
2000	80	72	66	61	56	52	49
2520	74	67	61	56	52	49	1
3175	75	64	57	54	50	45	1
4000	70	66	59	54	51	48	1
5040	63	59	54	50	1	1	1
6350	59	55	1	1	1	1	1
8000	54	54	1	1	1	1	1
10079	1	1	1	1	1	1	1
dBA equivalents	89	83	76	72	68	64	60

TABLE A2–5

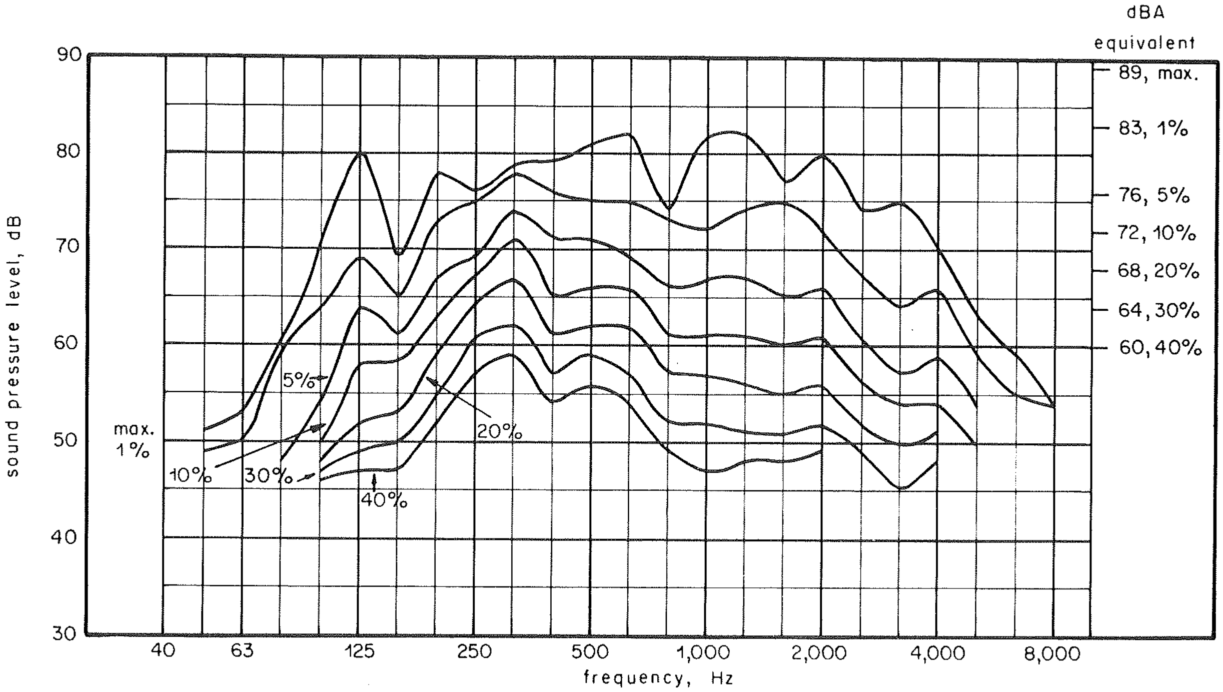

Fig. A2–5

CONTROL ROOM TO LARGE DRAMA STUDIO: TYPICAL AND WORST CASE RESULTS

The sound pressure levels experienced in the cubicles of large drama studios were found to vary very little from one recording session to the next, and so only a typical set of results 'A2–5' is presented.

Sound Pressure Level Analysis Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	63	61	52	49	1	1	1
63	60	58	53	53	52	51	50
79	63	62	58	56	54	52	50
99	66	64	62	60	58	56	55
125	67	65	63	60	58	56	54
157	70	63	61	59	56	55	53
198	75	73	69	67	64	63	61
250	75	73	69	67	65	63	61
315	74	70	68	66	63	61	60
397	74	69	66	64	62	61	59
500	72	69	65	63	61	58	56
630	73	68	65	62	59	57	55
794	68	66	62	60	57	55	53
1000	69	66	63	61	58	55	54
1260	72	70	64	62	59	57	55
1587	72	64	61	59	55	53	51
2000	64	62	58	56	54	51	49
2520	65	61	59	57	55	52	51
3175	60	59	56	55	52	50	48
4000	60	59	57	55	52	51	49
5040	58	55	52	49	1	1	1
6350	57	55	50	1	1	1	1
8000	54	52	1	1	1	1	1
10079	58	1	1	1	1	1	1
dBA equivalents	80	76	73	71	68	66	64

TABLE A2–6a/7a

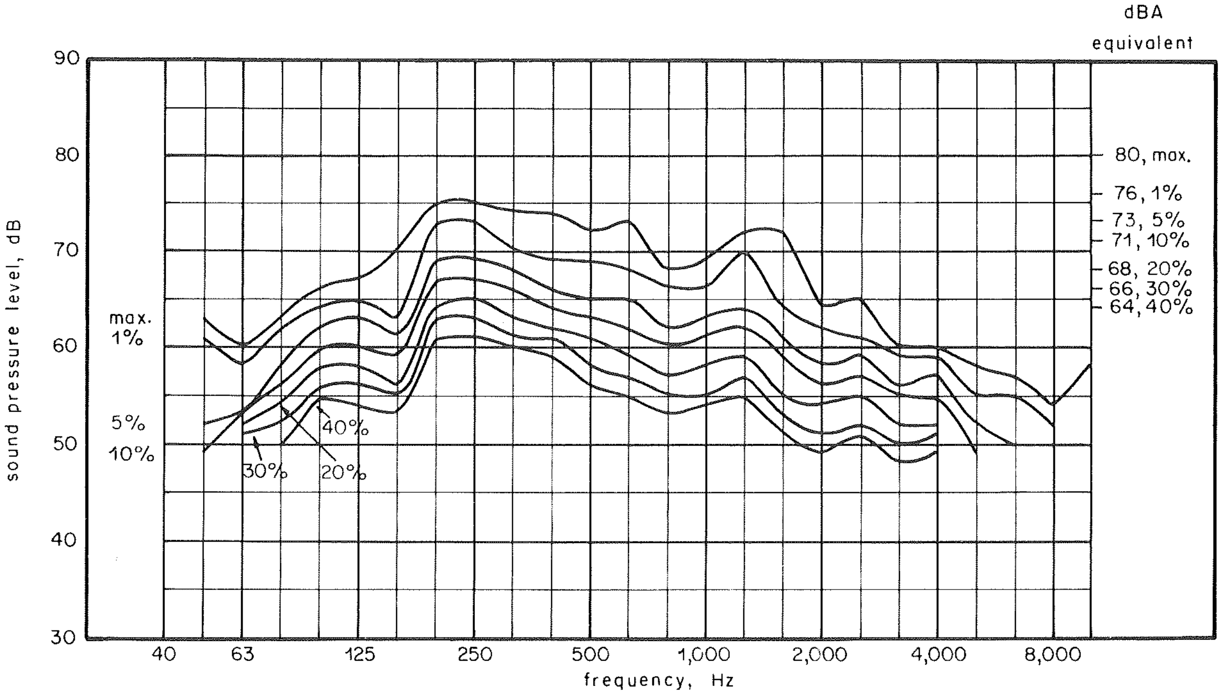

Fig. A2–6a/7a

CONTROL ROOM TO SMALL DRAMA STUDIO AND CONTROL ROOM TO TALKS STUDIO: TYPICAL RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	66	54	51	47	1	1	1
63	63	58	55	54	53	52	51
79	64	63	62	59	55	52	50
99	69	67	65	62	60	57	55
125	65	65	63	62	60	58	56
157	70	66	64	63	60	58	56
198	80	75	72	69	66	64	62
250	80	75	72	70	67	65	63
315	76	73	69	67	63	61	60
397	75	70	68	66	64	62	60
500	71	70	67	64	62	60	58
630	71	69	66	64	61	59	57
794	72	67	64	62	59	57	55
1000	69	68	65	62	59	56	54
1260	73	71	67	64	61	59	56
1587	72	65	63	61	58	56	54
2000	73	67	62	60	57	54	52
2520	75	67	63	61	57	55	53
3175	70	66	62	60	57	54	52
4000	68	64	61	58	55	53	50
5040	65	60	53	50	1	1	1
6350	63	59	52	40	1	1	1
8000	59	56	1	1	1	1	1
10079	57	1	1	1	1	1	1
dBA equivalents	83	78	75	73	70	68	66

TABLE A2–6b/7b

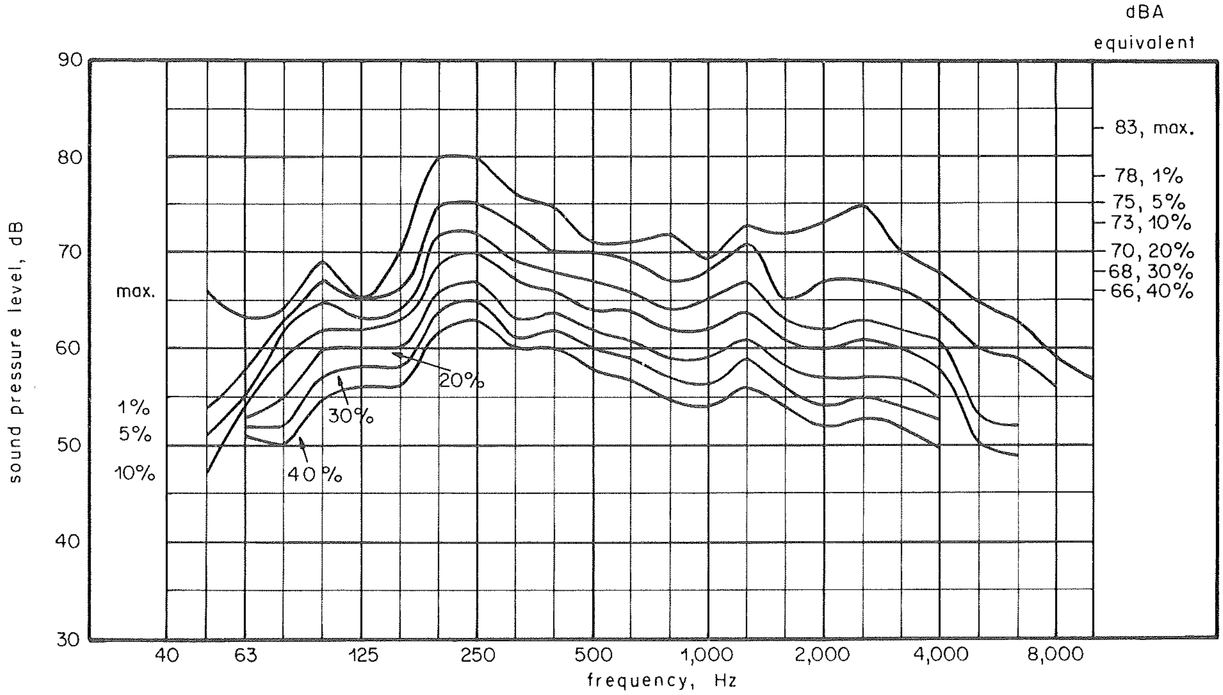

Fig. A2–6b/7b

CONTROL ROOM TO SMALL DRAMA STUDIO AND CONTROL ROOM TO TALKS STUDIO: WORST CASE RESULTS

Sound Pressure Level Analysis Level Exceeded x% of the Time

Freq. Hz.	Max	1%	5%	10%	20%	30%	40%
50	69	63	59	55	51	50	48
63	69	66	58	55	51	49	1
79	79	74	70	66	59	57	54
99	85	79	75	71	68	66	63
125	79	77	73	70	65	63	61
157	72	70	67	63	61	59	58
198	71	69	66	64	61	58	55
250	81	77	69	67	64	62	60
315	76	74	69	66	63	61	59
397	79	74	68	66	63	61	58
500	74	72	66	64	61	58	56
630	78	74	69	65	61	59	56
794	79	73	66	63	60	57	55
1000	74	70	62	59	55	53	51
1260	72	69	64	59	56	53	52
1587	72	67	63	58	55	52	50
2000	66	63	60	58	54	53	50
2520	67	64	61	57	52	51	49
3175	67	63	59	56	53	51	50
4000	66	59	56	53	51	49	1
5040	60	56	52	50	1	1	1
6350	55	54	1	1	1	1	1
8000	58	53	1	1	1	1	1
10079	53	1	1	1	1	1	1
dBA equivalents	84	80	74	71	68	65	63

TABLE A2–8a

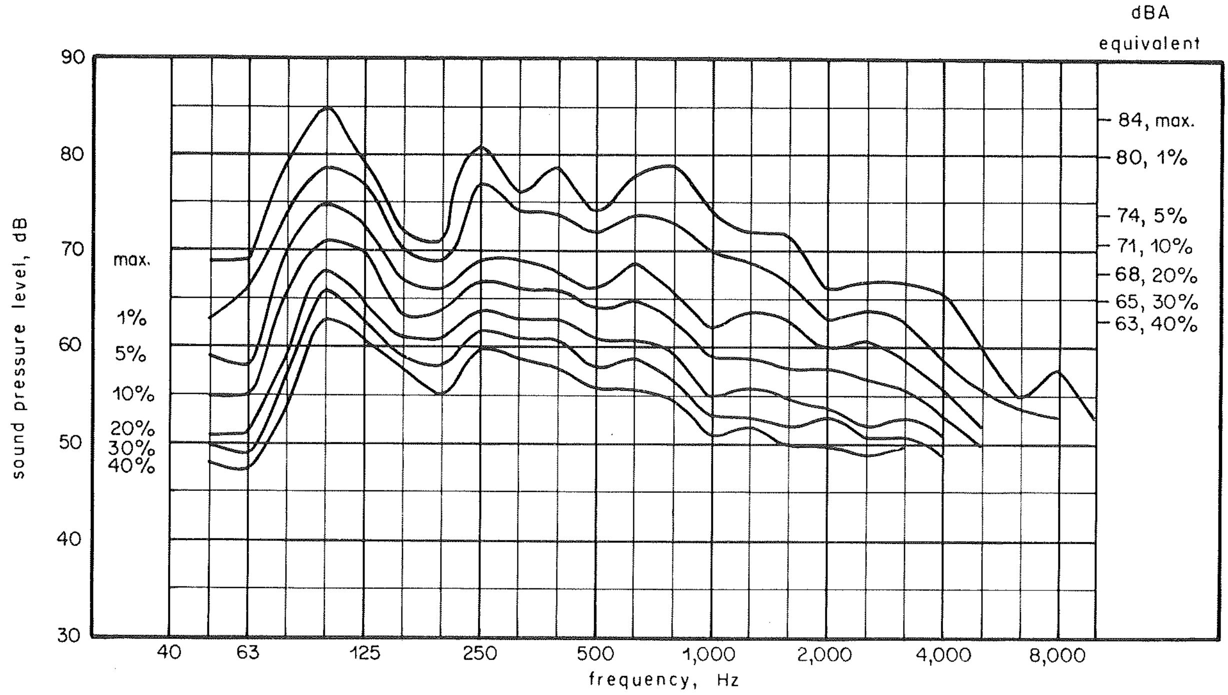

Fig. A2–8a

CONTROL ROOM TO CONTINUITY STUDIO (POP): TYPICAL RESULTS

Sound Pressure Level Analysis   Level Exceeded x% of the Time

Run	Max	1%	5%	10%	20%	30%	40%
50	66	60	53	50	47	1	1
63	66	64	58	56	53	51	49
79	73	71	66	64	61	58	57
99	82	77	69	66	63	60	58
125	73	72	67	64	62	61	59
157	76	73	70	68	66	64	62
198	73	72	68	65	63	61	59
250	77	76	72	70	67	65	62
315	82	78	73	71	68	66	64
397	78	76	71	69	66	63	62
500	82	80	77	75	71	68	66
630	79	78	75	73	71	68	66
794	79	75	72	71	69	65	63
1000	74	73	71	69	66	64	61
1260	80	77	71	70	67	65	62
1587	79	73	69	67	64	62	60
2000	73	70	67	65	63	60	59
2520	74	71	68	66	62	60	59
3175	81	77	72	69	65	62	61
4000	81	77	73	68	66	64	61
5040	76	75	67	65	62	59	57
6350	69	67	65	63	60	56	54
8000	73	69	65	64	60	57	55
10079	66	64	62	59	56	54	1
dBA equivalents	90	87	83	80	77	74	72

TABLE A2–8b

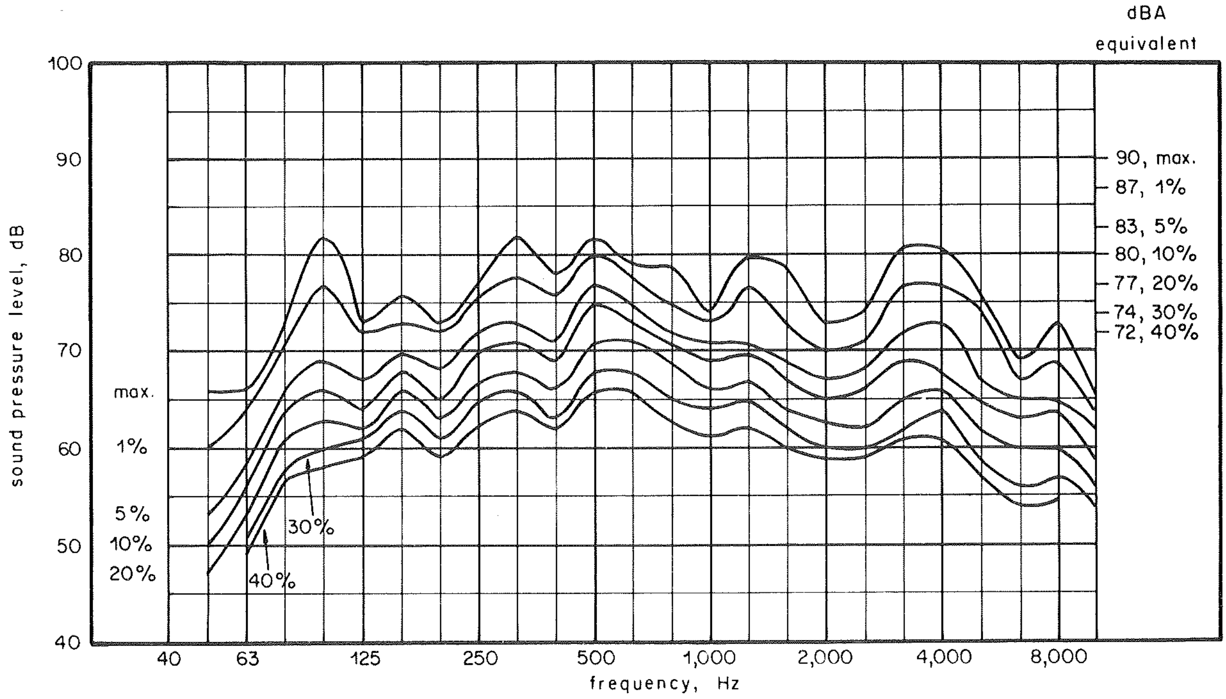

Fig. A2–8b

SMW/MS   *CONTROL ROOM TO CONTINUITY STUDIO (POP): WORST CASE RESULTS*

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